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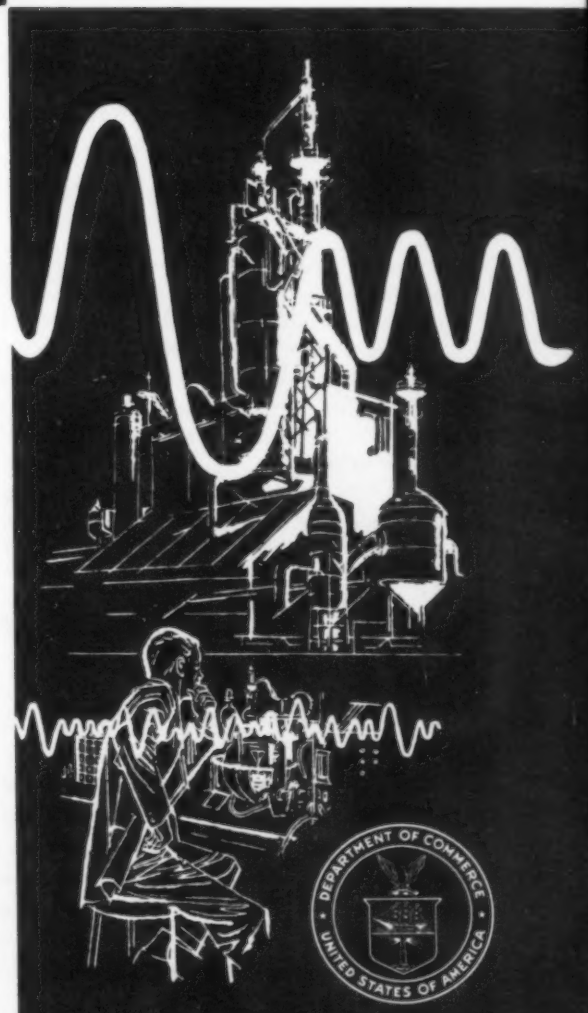

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TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-405 921 Div. 1, 21
(TISTA/LSK) OTS price $6.00

Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
DESIGN TECHNIQUES FOR FLIGHT CONTROL SYSTEMS IN NUCLEAR RADIATION ENVIRONMENTS.
Final rept.,
by R. M. Magee, G. M. Brown, S. I. Rosen, and C. D. Taulbee. Apr 63, 1v.
Contract AF33 616 8060, Proj. 8222, Task 822204
ASD TDR62 424, vol. 1 Unclassified report

Descriptors: *Flight control systems, Jet bombers, Aircraft nuclear propulsion, Nuclear propulsion, Nuclear power plants, Nuclear reactors, Reactor shielding materials, Heating, Flight instruments, Radiation damage.

The heating and activation problems of radiation from typical aerospace fission reactor power sources, and the use of self-shielding to minimize radiation damage have been investigated for flight control instrumentation. Emphasis is placed on the methodology an instrument designer may use to cope with these problems. (Author)

AD-405 982 Div. 1
(TISTA/LSK) OTS price $1.10

Beech Aircraft Corp., Wichita, Kans.
PROTOTYPE DEVELOPMENT MODEL 385 AIR REFUELING STORE.
Interim rept. no. 34, 1-30 Apr 63,
by W. G. Woods. 14 May 63, 4p. ER4741
Contract NOw60 0060c
Unclassified report

Descriptors: *Aeronautical booms, Refueling-in-flight, Hoses, Hose couplings, Fuel hose, Tests.

The activity on the Beech Model 385 Air Refueling Store consisted of duplication of reported deficiencies encountered on flight test, on ground test, and corrective reworks. Test results prove that the store did not function as intended during flight tests. It was found that the coupling required excessive force for engagement, and that the fuel pressure in the hose resulting from pressurization against a partially open but not fully engaged coupling stiffened the store hose excessively and to the extent that all response power was lost. The coupling manufacturer will correct the coupling deficiency and the excessive hose stiffening under the pressure was corrected by restoring the lubrication of the hose which was removed to accomplish hose marking. The store will be ready for return to flight test when a satisfactory coupling has been received and tested. (Author)

AD-406 168 Div. 1
(TISTA/LSK) OTS price $3.60

Douglas Aircraft Co., Inc., Long Beach, Calif.
SIMULATOR STUDY OF DIRECT LIFT CONTROL DURING CARRIER LANDING APPROACHES.
8 Apr 63, 37p. LB31253
Contract NOw61 0404t, Task 61 8
Unclassified report

Descriptors: *Carrier landings, Flight simulators, Trailing control surfaces, Glide-path systems, Lift, Model tests, Flight control systems, Flaps.

Fixed-base simulator tests of direct lift control were conducted during carrier landing approaches as a means of increasing flight path control precision. The direct lift control system that was tested consists of controlling the trailing-edge flaps of a Model A-3 ± 10 degrees from the normal 35-degree deflection at normal flight control rates. Control of the flaps was achieved through a three-position switch on the control stick, operating in the same sense as the basic longitudinal control and trim. The system was designed to supplement and not replace normal longitudinal control. The effectiveness of direct lift control was evaluated over a wide range of aerodynamics characteristics variations, including phugoid and short-period mode frequency and damping, and operation on the backside of the power-required curve. Direct lift control provided nominal improvements in landing approach, flight path control precision in those cases with good handling qualities or stability and control characteristics and considerable improvements in those cases with substandard handling qualities. Pilot opinion was strongly favorable to direct lift control although the quantitative effects were in some cases only nominal. Although the effects of direct lift control on minimum usable approach speed were not evaluated directly, improvements in flight path control precision and apparent handling qualities can reasonably be expected to permit reductions in minimum usable approach speed. (Author)

AD-406 210 Div. 1, 26
(TISTM/EJH) OTS price $4.60

MSA Research Corp., Callery, Pa.
HYDROGEN GENERATION FOR HIGH ALTITUDE BALLOONS.
Quarterly progress rept. no. 3, 1 Jan-1 Apr 63,
by W. J. Carter, R. A. Spencer and M. J. McGoff.
31 May 63, 42p. MSAR63 63
Contract DA36 039sc90699, DA Proj. 3M36 21 004 02
Unclassified report

Descriptors: *Meteorological balloons, *Hydrogen, *Gas generating systems, High altitude, Sodium compounds, Aluminum compounds, Hydrides, Borohydrides, Catalysts, Lithium compounds, Cobalt compounds, Chlorides, Containers, Design, Storage, Balloons.

During this report period ninety small and large scale tests (up to 270 cu ft H2 STP) were run. Data obtained from these tests enabled the design and packaging of fifty NaBH4, fifty NaAlH4 charges and the design and fabrication of a test model Hydrogen Generator (Model XI). Two runs with the test model hydrogen generator were conducted, each reacting three NaBH4 charges and evolving the required 135 cu ft H2. Parameters investigated during this period included the forming pressure and physical packaging technique of large and small quantities of NaBH4; and the mixing of various amounts and combinations of catalysts. These efforts were primarily directed toward obtaining a uniform hydrogen generation rate from NaBH4. The best package developed was a 550 gm NaBH4 charge containing 40 gm LiH, 11 gm CoCl2 pressed in a 3 in. x 8 7/8 in. canister. A uniform H2 generation rate has been achieved with NaAlH4. Shelf life tests indicated NaBH4 samples stored at 50 C gave lower yields than fresh control samples and required a longer time for H2 evolution. The NaAlH4 runs showed no significant differences from similar fresh controls. (Author)

AD-406 212 Div. 1
(TISTA/LSK) OTS price $6.60

Kellett Aircraft Corp., Philadelphia, Pa.
HELICOPTER STATIC ELECTRICITY DISCHARGING DEVICE,
by Juan de la Cierva. Dec 62, 56p.
Contract DA44 177tc728, Task 1D121401A14130
TCREC TR62 33 Unclassified report

Descriptors: *Helicopters, *Static discharges, Electric discharges, Static electricity, Design.

Results are presented on a program for the alleviation of static electricity problems associated with helicopters. During the program a static electricity discharging device for helicopters was designed, built and tested. Flight tests were performed with an H-37 helicopter under a number of different flight conditions. During these flights conducted in a natural charging current of 2 microamperes, the discharging device maintained the electrostatic energy level at below 1 millijoule. It has been established that this energy level satisfactorily alleviates the existing problems caused by the presence of electrostatic charge. Factors affecting the performance of the device are listed, and recommendations are made to optimize future discharger research. Also, a test program was conducted to determine the performance of high voltage corona point probes under varying conditions of vehicle charge and polarity, corona point potential and corona point geometry. The capacitance to ground of H-21 and H-37 aircraft was determined experimentally, as well as the effect of the air velocity on the current output of high voltage corona points. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-405 940 Div. 2, 25
(TISTM/EJH) OTS price $8.10

Metronics Associates, Inc., Palo Alto, Calif.
INTERMEDIATE-SCALE AEROSOL CLOUD TRAVEL AND DIFFUSION FROM LOW-LEVEL AERIAL LINE RELEASES,
by L. M. Vaughan and R. W. McMullen. 30 Jan 63, 81p. TR97
Contract DA42 007cm1543
Unclassified report

Descriptors: *Aerosols, *Scattering, Diffusion, Meteorology, Temperature, Particles, Fluorescence, Wind, Sampling, Heat, Dosage, Mathematical analysis,

A series of low-level aerial line releases of fluorescent particles under a variety of atmospheric stability conditions is being conducted at Dugway Proving Ground, Utah. Aerosol samples are obtained at ground level to 15 miles and aloft to 700 feet from tower and balloon-mounted samplers. The first nine of these trials have been analyzed in terms of a diffusion model based on estimates of the vertical eddy heat flux obtained from mean temperature profiles and their change with time. Satisfactory agreement was obtained between calculated and observed dosages when the winds at release altitude were reasonably uniform and nearly parallel to the downwind sampling line. (Author)

AD-406 082 Div. 2
(TISTP/FR) OTS price $1.60

Institute for Defense Analyses, Washington, D. C.
DEPTH OF FOCUS DISCRIMINATION BY CRUSTAL PHASES FOR NTS NUCLEAR EXPLOSIONS,
by John DeNoyer. Mar 63, 14p. RP P12;
IDA HQ63 1345
Contract SD50
Unclassified report

Descriptors: *Seismic waves, Underground explosions, Nuclear explosions, Velocity, Lithosphere, Seismological stations.

Time residuals for Pg-Pn intervals as a function of epicentral distance and Sg-Pn intervals are examined for 'calibrated' source-to-recording-station paths. At some stations, it is found that the residuals are reduced by about one-half when true epicentral distance is used. Depths of foci for 16 nuclear explosions are estimated from Pg-Pn residuals. When the average is taken for depth estimates from three or more recording stations, the results are within 10 km of the surface. Depths computed from single stations may be as much as 30 km in error. The greatest source of error is in reading arrival times of the Pg phase with sufficient accuracy from LRSM three-component recordings. (Author)

AD-406 094 Div. 2, 31
(TISTP/AMS) OTS price $2.40

David Taylor Model Basin, Washington, D. C.
STRUCTURAL DESIGN OF VIEWING PORTS FOR OCEANOGRAPHIC VEHICLES,
by James A. Nott. Mar 63, 22p.
Proj. S F013 0103
DTMB 1737
Unclassified report

Descriptors: *Oceanographic vessels, *Oceanographic equipment, *Underwater equipment, Cylindrical bodies, Optical equipment, Models (Simulators), Model tests, Model basins, Titanium, Acrylic resins, Pressure, Hulls (Marine), Stresses, Equations, Mathematical analysis, Design, Underwater.

A design procedure for the reinforcement of viewing port openings in spherical shells for deep-diving oceanographic vehicles is presented. This procedure is based on the concepts of membrane deflection and zero rotation of the spherical head to the viewing port intersection. A small model was tested to determine the validity of the developed procedure. Strain measurements indicated that no appreciable bending occurred and that the structure reacted in a highly favorable manner under hydrostatic loading. (Author)

AD-406 215 Div. 2, 6, 12
(TISTP/TCG) OTS price $4.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
EFFECTIVE ANTENNA TEMPERATURE FROM TERRESTRIAL AND COSMIC NOISE IN THE 0.1- TO 40.0-Gc BAND,
by A. Naparstek. Mar 63, 41p. 4515 20T
Contract AF33 616 8244, Proj. 1 620 5191, Task 50927

Unclassified report

Descriptors: *Antennas, *Extraterrestrial radio waves, *Temperature, Radiofrequency, Noise (Radio), Brightness, Meteorological parameter, Earth, Oxygen, Water vapor, Masers, Absorption, Attenuation, Theory.

This report presents a derivation of an expression for the effective antenna temperature for an antenna viewing a multitude of discrete and distributed radiofrequency noise sources. The presentation makes use of concepts, parameters, and units that have been introduced in radio astronomy for the purpose of describing measurements of radio-frequency radiation of extraterrestrial origin. The report also presents a comprehensive review and analysis of current knowledge of and available data on radio-frequency noise of terrestrial and extraterrestrial origin in the 0.1- to 40.0-Gc frequency band. These data, together with the derived equation for the effective antenna temperature, will enable one to calculate the effective antenna temperature for any antenna located on the earth's surface, provided the normalized power pattern, the directivity, and the efficiency of the antenna are known. The report also shows how to determine realistic bounds for the effective antenna temperature of antennas located in aerospace. (Author)

AD-406 270 Div. 2
(TISTP/RLG) OTS price $1.10

Naval Oceanographic Office, Washington, D. C.
OPERATION DEEP FREEZE 1963 ROSS SEA OCEANOGRAPHIC SURVEY.
2 May 63, 3p.
N00 S2346

Unclassified report

Descriptors: *Polar regions, *Oceanographic data, *Oceanographic equipment, Temperature, Salinity, Plankton, Paleoecology, Geochemistry, Oceanology, Samplers, Ocean bottom sampling.

The oceanographic survey program was divided into two phases: (1) occupation of a series of standard oceanographic stations with a station interval of approximately 30 miles, and (2) occupation of specific stations after 1 March 1963 for ice forecasting potential. During both phases, NAVOCEANO personnel made standard oceanographic station observations, and collected bottom sediment and biological samples. (Author)

AD-406 271 Div. 2, 30
(TISTP/WH) OTS price $3.60

Aeronautical Chart and Information Center, St. Louis, Mo.
OPERATIONAL USE OF THE AP-2 AT ACIC,
by William C. Mahoney. Mar 63, 26p.
ACIC TP11

Unclassified report

Descriptors: *Photogrammetry, *Instrumentation, *Special purpose computers, Mapping, Design, Tests.

This paper describes experiences at ACIC obtained with the AP-2 Plotter. It discusses the basic concepts upon which the AP-2 Plotter operates, some key tests performed, problems associated with its introduction into a mapping organization and evaluates the plotter in respect to contemporary instrumentation. Emphasis in technical discussion is placed upon the capability of the plotter to remove systematic distortions arising from random and non-random sources. This instrument represents a great advancement in photogrammetric instrumentation, but in its present form should not be expected to reduce operational time significantly in bridging and compilation operations. The AP-2 allows more complete exploitation of photogrammetric materials but because of its complexity and increased requirements for advanced personnel training, it will not be easy for most organizations to incorporate it in their line operations. (Author)

AD-406 295 Div. 2
(TISTP/RLG) OTS price $1.10

Directorate of Scientific Information Service (Canada).
A NEW DIRECTION IN COSMIC RAY RESEARCH,
by A. A. Pomanski, tr. by E. R. Hope. 1963, 2p.
DSIS T377R

Unclassified report

Trans. from Vestnik Akademii Nauk (SSSR), vol. 11, pp. 130-131, 1962.

Descriptors: *Cosmic rays, Symposia.

AD-406 369 Div. 2
(TISTP/WH) OTS price $1.60

Block Associates, Inc., Cambridge, Mass.
ATMOSPHERIC INFRARED OPTICS - FLUX MEASUREMENTS.
Semi-annual rept. no. 3, 1 July-31 Dec 62,
by Merle J. Persky. 31 Dec 62, 8p.
Contract AF19 628 210

Unclassified report

Descriptors: *Atmosphere, *Balloons, *Infrared spectroscopy, Infrared radiation, Instrumentation, Interferometers.

A balloon-borne experiment to measure the upward and downward atmospheric radiance is described. The instruments used were two infrared interferometer spectrometers, Block Associates, Inc. Models I4T and I4TC, the I4T looking alternately at the nadir and zenith while the I4TC looked continually at the nadir. (Author)

AD-406 377 Div. 2, 20
(TISTM/EJH) OTS price $5.60

Army Engineer Research and Development Labs., Fort Belvoir, Va.
SOIL DENSITY STUDIES IN CONNECTION WITH DETECTION OF UNDERGROUND NUCLEAR EXPLOSIONS. PART I - NUCLEAR TECHNIQUES. PART II - THERMAL TECHNIQUES. PACKRAT, HARDHAT AND GNOME EVENTS.
Final technical rept.
1 Nov 62, 50p.

Unclassified report

Descriptors: *Underground explosions, *Nuclear explosions, *Soils, Instrumentation, Radiation measurement systems, Density, Radiometers, Thermal radiation, Infrared images, Blast, Detection.

Nuclear techniques: The continuous-reading Qualicon 502 bulk density gauge cannot be used effectively to detect density differences in the soil because of extreme sensitivity to height variations and soil micro-relief. The P-22 surface density gauge is suitable for detecting soil density differences. Effects of normul variations in local soil texture, structure and moisture content (weather conditions) will present serious problems in the use of any soil-density measuring instrumentation for detection of underground explosion areas and may invalidate their use. Thermal techniques: Although extreme background temperature contrasts may present thermal imaging problems, satisfactory imaging of a test area can be accomplished with good image detail during both day and night observations. The Packrat blast site was detectable on Thermograph T-2 thermal images during both day and night. (Author)

AD-406 606 Div. 2
(TISTP/RLG) OTS price $1.10

4th Weather Wing, Colorado Springs, Colo.
AN OBJECTIVE AID FOR FORECASTING STRONG AND GUSTY SURFACE WINDS AT PORTLAND AFB, OREGON,
by Thomas H. Simmonds. Rev. May 63, 2p.
Unclassified report

Descriptors: *Micrometeorology, *Winds, Meteorological charts, Meteorological parameters, Weather stations, Gusts, Weather forecasting, Data.

Forecasting the occurrence of operationally critical values of strong surface winds with accompanying gusts presents a major problem at Portland AFB, Oregon. This investigation concerns the forecasting of strong southwesterly surface winds with gusts greater than 25 knots during the months of December through March.

AD-406 626 Div. 2, 6
(TISTP/RLG) OTS price $2.60

Air Force Proving Ground Command, Eglin Air Force Base, Fla.
A METHOD OF REFINING ELECTRICAL REFRACTIVE INDEX PROFILES WHEN USING RADIOSONDE DATA,
by Myles M. Mitchell. Mar 63, 17p.
APGC TDR63 20 Unclassified report

Descriptors: *Refractive index, *Meteorology, *Humidity, Refractometer, Airborne, Computers, Data, Electricity, Radiosondes, Statistical analysis.

A method is described for providing greater detail in the profile of electrical refractive index derived from radiosonde data. This method uses a greater number of significant levels of moisture. Profiles derived from radiosonde are compared with selected refractometer profiles. In addition, selected data are used to illustrate certain space and time variations of the refractive index in the Eglin Gulf Test Range. (Author)

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-406 066 Div. 3, 24, 6
(TISTM/PCR) OTS price $1.10

Southern Research Inst., Birmingham, Ala.
(No title).
Monthly progress rept.,
by James Hostettler and Alvin Bird. 6 June 63, 3p.
Contract DA18 108AMC32 A
Unclassified report

Descriptors: *Aerosols, *Flash lamps, *Detectors, *Chemical warfare agents, Reticles, Lighting equipment, Television equipment, G agents, Detection, Cameras, Electrochemistry.

4. CHEMISTRY

AD-405 903 Div. 4, 10
(TISTM/EJH) OTS price $1.60

Tracor Inc., Austin, Tex.
ELECTROCHEMICAL STUDIES IN THE SYNTHESIS OF N-F COMPOUNDS.
Quarterly status rept. no. 1, 1 Jan-31 Mar 63, 28 May 63, 10p. GR6 6601
Contract Nonr405400
Unclassified report

Descriptors: *Electrochemistry, *Nitrogen compounds, *Fluorides, Fluorination, Solutions, Hydrogen compounds, Ions, Ammonia, Electrolysis, Electrolytic cells, Electrodes, Solid rocket oxidizers, Synthesis (Chemistry).

The aim of this project is to determine the likelihood of obtaining ionic species containing only N and F or N, H, and F in anhydrous hydrofluoric acid (AHF) solutions. The experimental approach is based on the determination of the theoretical and electrochemical properties of solution species in solutions obtained by dissolving compounds such as NF3,NHF2, and N2F4 in AHF. Constant potential techniques are planned using passivated electrodes to study the mechanism of the electrosynthesis of N-F compounds (e.g. NF3) when NH3 is electrolyzed in AHF. Concurrent conductance experiments will be used to determine the concentration of ionic (protonated) species in solutions of the N-F compounds in AHF. By combining the data from these two types of experiments, the extent of participation of protonated N-F species in the electrode reactions can be determined. An electrochemical cell has been designed and assembled which provides for the production of solutions of the N-F compounds of known concentration. (Author)

AD-405 917 Div. 4
(TISTM/BRW) OTS price $1.60

Tennessee Valley Authority, Norris.
HEATS OF FORMATION OF PHOSPHORUS OXIDES.
Progress rept. no. 2, 1 Dec 62-31 May 63,
by E. P. Egan, Jr. and B. B. Luff. 10 June 63
10p.
Contract CMLMC PA2B RFP129
Unclassified report

Descriptors: *Phosphorus compounds, *Heat of formation, Determination, Calorimeters, Combustion, Acrylic resins, Phosphorus, Combustion products, Oxides.

Results of 14 combustions of distilled phosphorus coated with Lucite are tabulated. The average value for the heat of combustion is 713.59 kcal. per mole P4, but the average deviation, ±0.26%, is larger than is acceptable for the determination of the heat of formation of P4O10. The deviation is decreased

if no correction is made for HPO_3 formation from the water from the combustion of Lucite, which indicates that the assumed formation of HPO_3 is not adequate, but there is no satisfactory substitute for this assumption. Errors of only a few milligrams in the sample weights would account for the deviations, but there is no reason to suspect the weights. (Author)

AD-406 224 Div. 4, 25
(TISTM/EJH) OTS price $4.60

Moleculon Research Corp., Cambridge, Mass.
RESEARCH ON BENZIMIDAZOLE DERIVATIVES.
Final rept., Mar 62-Feb 63,
by A. S. Obermayer, L. D. Nichols, C. E. Breed, B. E. Norcross, and M. Panar. 31 Mar 63, 37p.
Contract AF19 628 418, Proj. 6692, Task 66922
AFCRL 63 444 Unclassified report

Descriptors: *Organic compounds, *Semiconductors, Molecular structure, Fluorescence, Electrical properties, Spectra (Infrared), Spectra (Visible and ultraviolet), Stability, Purification, Crystals, Polymers, Electrical conductance, Nitrogen compounds, Solubility, Chromatographic analysis, Synthesis (Chemistry).

The synthesis, purification, and characterization of a large number of benzimidazole derivatives are described. Compounds have been prepared which allow for the correlation of systematic structural variations with the physical and electrical properties. (Author)

AD-406 699 Div. 4, 16
(TISTM/AAR) OTS price $1.60

Kyoto U. (Japan).
PHYSICO-CHEMICAL STUDIES ON THE MICROSOMAL RIBONUCLEOPROTEIN PARTICLES.
Final rept., 15 Mar 62-14 Mar 63,
by Akira Inouye. 14 Mar 63, 14p.
Contract DA92 557FEC34753
Unclassified report

Descriptors: *Microsomes, *Liver, Physiology, Chemistry, Ribonucleic acids, Lymphatic system, Nuclei, Nucleotides, Nucleoprotein.

By ESR spectra and magnetic susceptibility measurement, the ferromagnetic behavior of liver ribosome, ribosomal RNA and thymus DNA was studied. The results obtained strongly suggested that RNA and DNA of high molecular weight are ferromagnetic in themselves and hence they would be so even in the ribosomes or nuclei. Some studies on the brain microsomes were made. Using the method of isolating liver ribosome, it was found that brain ribosomes were also composed of 110s, 80s and 60s component. Electronmicroscopically, they appeared very similar to liver microsomes. Using ultracentrifugation in the density gradient of sucrose, subfractionation of brain homogenate was carried out. The mitochondrial as well as the microsome particles were found to contain some physiologically active substances such as ACh, SP, Nor and 5HT. Electronmicroscopical observations strongly suggested that these substances, which were assumed as a candidate of central transmitter hitherto, were normally present in the particles similar to the isolated nerve ending described by de Robertis school. The activity of these substances recovered in the microsomal fraction seems to be attributed to the microvesicles (i.e., synaptic vesicles) originated from the disrupted endings. According to their stainability with OsO_4, these ending-like elements seem to be classified into two categories; cholinergic ones containing ACh and SP and non-cholinergic ones containing Nor and 5HT. The former is lighter and lightly stained with OsO_4. (Author)

5. COMMUNICATIONS

AD-405 952 Div. 5, 32
(TISTM/DGH) OTS price $2.60

Defense Documentation Center, Cameron Station, Alexandria, Va.
COMMUNICATIONS.
June 63, 16p.
Unclassified report

Descriptors: *Communications systems, *Bibliographies, Television communications systems, Radio communications systems.

AD-406 055 Div. 5, 1
(TISTE/CRJ) OTS price $5.60

Bell Telephone Labs., Inc., Whippany, N. J.
AIRBORNE COMMUNICATION SYSTEM MARCOM RELAY.
Quarterly progress rept. no. 3, 15 Dec 62-15 Mar 63.
15 Apr 63, 54p.
Contract DA36 039sc89250, DA Proj. 3B55 04 001 01
Unclassified report

Descriptors: *Microwave communication systems, *Microwave relay systems, Superhigh frequency, Radio transmission, Diversity reception, Microwaves, Propagation, Antennas, Airborne.

Research was continued on air-to-air and ground-to-air microwave propagation and transmission to aid in predicting the capabilities of multichannel microwave communication systems using airborne radio relay stations. It was tentatively concluded that the branching of 12-channel groups from 60-channel supergroups will present no major technical difficulties. Branching (and other types of switching) in the airborne platforms can be accomplished best on a per mission basis and not normally during flight. Frequency studies to date indicate that a frequency plan providing maximum assignment flexibility is extremely costly in terms of RF spectrum. A less flexible plan seems indicated for the expected system configurations. (Author)

AD-406 315 Div. 5, 12
(TISTE/CRJ) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
MODULATION CONSIDERATIONS FOR THE TRANSMISSION OF REAL-TIME SPACE TELEVISION,
by Jean A. Develet, Jr. 13 May 63, 13p.
TDR169 3250 43TN3
Contract AF04 695 169
SSD TDR63 117
Unclassified report

Descriptors: *Space communication systems, *Television communication systems, *Lunar craft, Digital systems, Analog systems, Pulse modulation, Coding, Frequency modulation, Broadband, Space-to-surface, Surface-to-space, Communication satellites (Active), Communication satellites (Passive), Modulation, Space environmental conditions, Communication systems.

Modulation considerations for the design of a real-time space/earth television link were treated. To illustrate two extremes of transmission possibility, the baseband signal was assumed: (1) digitally encoded and modulated on a carrier as binary PCM/PM; and (2) analogue modulated as wideband FM. Standards of quality established for the design of each system were

then used to estimate receiver power requirements. The performance and complexity of these two approaches were then reviewed with parameters typical of a moon mission. In comparing the digital to the analogue approach, it was found that the analogue system was superior in all respects, e. g., simplicity, reliability, and spacecraft power. Identical comparisons as the foregoing were necessary to establish the modulation techniques for Telstar and Relay, the world's first wideband communication satellites. It is not surprising, therefore, that these satellites utilize analogue wideband FM with frequency-following receivers. (Author)

AD-406 320 Div. 5, 8
(TISTE/CAM) OTS price $10.10

Holmes and Narver, Inc., Los Angeles, Calif.
U.S. NAVY VLF-COMMFACPAC. MODEL STUDIES OF THE VLF PAC ANTENNA.
12 Apr 63, 1v.
Contract NBy37636

Unclassified report

In cooperation with Continental Electronics Manufacturing Co., Dallas, Tex., and DECO Electronics, Inc., Boulder, Colo.

Descriptors: *Antennas, Very low frequency, Configuration, Capacitance, Electrical impedance, Measurement, Antenna masts, Wind, Load distribution, Calibration, Data, Tables, Navy, Model tests.

AD-406 463 Div. 5, 25, 8
(TISTE/JWS) OTS price $6.60

Kearfott Div., General Precision, Inc., Little Falls, N. J.
THE BROADBAND ANTENNA STUDY PROGRAM.
Final rept. on Phase II, 21 Oct 62-21 Mar 63.
7 May 63, 51p.
Contract NOm72423

Unclassified report

Descriptors: *Antennas, *Antenna configurations, High frequency, Admittance, Ultrahigh frequency, Models (Simulations), Very high frequency, Loop antennas, Omnidirectional antennas, Antenna radiation patterns, Antenna masts, Broadband, Military requirements.

Determination of an antenna design which will provide the Marine Corps with a broadband antenna over the range 6-30 mc considerably reduced in size from those presently available and capable of simple and rapid field installation is outlined. Its long range purpose is the continuation of these investigations in an effort to further develop a size reduced antenna over the extended range of 2-100 mc. Two new models of the Scimitar, several UHF models and a VHF model of the Sinuous Log Periodic were tested and evaluated. A proposed mechanical design and installation instructions for a full scale engineering model of Scimitar No. 2, designed to operate over the range 6-42 mc, is included. Within the ''state-of-the-art'' survey several new developments are discussed. These include a discussion of a Fast Wave Antenna investigation, preliminary tests on a multi-turn loop tunable configuration developed at Kearfott, and the Hula Hoop (DDRR) antenna. Mention is also made of a new lightweight transportable Log-Periodic Antenna developed by Granger Associates and a new broadband multicoupler which will operate over the range 2-30 mc. (Author)

AD-406 700 Div. 5, 18, 8
(TISTE/OHD) OTS price $13.50

RCA Defense Electronic Products, New York.
AN ANALYSIS OF PCM TRANSMISSION VIA SINGLE SIDEBAND,
by R. Gardner and J. Rabinowitz. 1 May 63, 191p.
CR63 419 2
Contract DA36 039sc87240

Unclassified report

Descriptors: *Pulse communication systems, *Frequency modulation, Feasibility studies, Pulse modulation, Ultra high frequency, Radio communication systems, Mathematical analysis, Tactical warfare, Communication theory, Single sideband communication systems, Radio relay systems.

The object of this analysis is to determine the relative merits of single-sideband transmission as against FM transmission of multichannel (e.g. 12-channel) PCM signals, for tactical radio relay equipment in the lower portion of the UHF range, and to recommend immediate and long-range development plans. The results, conclusions and recommendations of this analysis are given. (Author)

6. DETECTION

AD-405 951 Div. 6, 30, 12, 2
(TISTM/PCR) OTS price $2.60

Defense Documentation Center, Cameron Station, Alexandria, Va.
DETECTION AND SURVEILLANCE.
June 63, 16p.

Unclassified report

Descriptors: *Detection, *Tracking, *Bibliographies, *Abstracts, Moon, Radio interference, Ionosphere, Detectors, Signal-to-noise ratio, Satellites (Artificial), Orbital trajectories, Optical tracking, Interferometers, Interception probabilities, Radar equipment, Guided missile tracking systems, Radar pulses, Space flight, Infrared detectors, Direction finding, Antimissile defense systems, Guided missiles (Surface to air), Electronic scanners, Radio equipment, Telescopes, Radio astronomy, Venus, Communication systems, Van Allen radiation belt, Guided missiles (Surface to surface), Microwaves, Meteors, Guided missiles, Spacecraft.

AD-406 088 Div. 6
(TISTP/AW) OTS price $6.60

David Sarnoff Research Center, Princeton, N. J.
(No title).
Summary rept.,
by M. L. Schultz. 31 Dec 62, 59p.
Contract Nonr222500

Unclassified report

Descriptors: *Infrared photoconductors, *Infrared detectors, Impurities, Nickel, Cobalt, Gold, Germanium alloys, Silicon alloys, Heat of activation, Single crystals, Temperature, Germanium, Materials.

Two lines of research on extrinsic germanium photoconductors are described in this report. Part I deals with an investigation of photoconductors designed to function in the 3 to 5 micron region. For this, germanium-silicon alloys activated with

Au(II) and germanium activated with Co(II) or Ni(I) were studied. Germanium activated with nickel appeared to be the best solution, although its peak response is somewhat below 5 microns. It is probable that when prepared with optimum compensation, its performance would equal that of the known intrinsic photoconductors. Its stability, uniformity, and ease of preparation might be superior. Part II treats the behavior of photoconductors using compensated donor levels near the valence band as pseudo acceptor activators. The lowest levels of gold (25 microns) and cobalt (15 microns) were examined. Promising results were obtained, but further work is required to determine whether advantage can be taken of the possible two or three orders of magnitude increase in lifetime (and consequently in photoconductive gain) which should be available. (Author)

AD-406 099 Div. 6, 25, 26
(TISTM/EJH) OTS price $3.60

Lansdale Div. Philco Corp., Pa.
PEM FOR GOLD-DOPED GERMANIUM INFRARED DETECTOR TYPE IR400.
Quarterly progress rept. no. 1, 27 Dec 62-27 Mar 63,
by D. Skvarna. 27 Mar 63, 1v.
Contract DA36 039AMC01464e, Proj. H-200
Unclassified report

Descriptors: *Infrared detectors, *Germanium, *Single crystals, Manufacturing methods, Crystal growth, Impurities, Barium compounds, Fluorides, Glass seals, Metal seals, Silicon, Silicon compounds, Monoxides, Wave transmission, Materials.

Work on a PEM for producing p-type Au-doped Ge infrared detectors, Type IR400 is reported. Efforts were divided into 3 main categories: Au-doped Ge crystal growing, material evaluation and testing, and barium fluoride transmission window sealing to glass and metal. The procedures involved in material and device fabrication and testing are discussed. Evaluation data is included in tabular and graphic form. Problems encountered in device fabrication and testing and difficulties experienced in the barium fluoride sealing program are also discussed. (Author)

AD-406 204 Div. 6, 12, 9, 25
(TISTP/MFA) OTS price $5.60

RAND Corp., Santa Monica, Calif.
RADAR ECHO FROM RE-ENTRY VEHICLES,
by Herschel Weil. May 63, 43p. RM3251 PR
Contract AF49 638 700
Unclassified report

Descriptors: *Plasma physics, *Reentry vehicles, *Radar echo areas, Theory, Electric fields, Magnetic fields, Electrons, Electron density, Partial differential equations, Permeability (Magnetic), Radar tracking, Reflection, Ionosphere, Wake, Electromagnetic waves, Measurement.

The problem of computing the radar echo from reentry vehicles is treated, primarily to indicate what types of radar-return estimates can be made using presently available results from the gasdynamic theory of wakes and from electromagnetic theory. Numerical results for low-frequency reflectivities and radar cross sections are obtained for a particular computed re-entry wake viewed broadside. The resulting radar cross sections, although orders of magnitude greater than the radar cross section of the vehicle with no wake, are smaller than the broadside geometric cross section of the wake region within which the local plasma frequency is greater than the radar frequency. Some specific electromagnetic problems are outlined, the solution of which would aid in obtaining results better than the crude estimates presently achievable. (Author)

AD-406 273 Div. 6, 22
(TISTP/JEA) OTS price $1.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
RADIATION CHARACTERISTICS OF THE XM-13 AND THE 20 MILLIMETER HISPANO SUIZA TRACER ROUNDS,
by M. Nowak, J. R. Staley, R. B. Davis, and W. S. Wheeler, III. May 63, 16p.
FRL TR3049
Unclassified report

Descriptors: *Tracers (Ordnance), *Radiation measurement systems, Infrared radiation, Ultraviolet radiation, Time, Intensity, Brightness, Antiaircraft ammunition, Spectrum analyzers.

The XM-13 tracer and 20 millimeter Hispano Suiza tracer were tested under static laboratory conditions for their radiant output characteristics in the range of .4 to 1.1 microns. The following information was obtained for both items: (a.) The spectral energy distribution; (b.) Time intensity curve; and (c.) Average brightness distribution. (Author)

AD-406 294 Div. 6, 25
(TISTE/JWS) OTS price $6.60

David Sarnoff Research Center, Princeton, N. J.
INFRARED PHOTOCONDUCTORS.
Summary rept.,
by M. L. Schultz. 31 Dec 62, 59p.
Contract Nonr222500
Unclassified report

Descriptors: *Photoelectric materials, Semiconductors, Germanium alloys, Silicon alloys, Impurities, Gold, Photoconductivity, Nickel, Cobalt, Temperature, Solid state physics, Infrared radiation.

Efforts were expended to investigate extrinsic germanium photoconductors activated with such impurities as cobalt or gold where a donor level near the valence band is compensated with an acceptor. Under these circumstances, the donor level becomes a pseudo-acceptor level and can serve as the activator for infrared photoconductivity. Under certain operating conditions, such activator centers should have much smaller capture cross-sections than normal acceptor centers, which should be reflected in greater responsivity. Other anomalous effects might also be expected. The efficacy of extrinsic germanium as a relatively short wavelength (5 mu) infrared photoconductor is also to be explored. Nickel as an impurity in germanium is an acceptor with an ionization energy of about 0.23 electron volts. Material with this activator will be prepared and tested. Two other short wavelength photoconductors are also of interest and will be investigated. These are cobalt in germanium and gold in germanium-silicon alloy. (Author)

AD-406 775 Div. 6, 22
(TISTA/EJH) OTS price $5.60

Aeronautical Research Lab., Office of Aerospace Research, Wright-Patterson Air Force Base, Ohio.
AUTOMATIC OPTICAL RANGE FINDER,

by Werner Rambauske and Hubert Kuesters. Feb 63, 49p.
Proj. 7072, Task 70827
ARL 63 48 Unclassified report

Report on Research on Quantum Nature of Light.

Descriptors: *Range finding, *Optical target designators, Electron optics, Optical equipment, Homing devices, Scanning, Infrared optical systems, Mathematical analysis, Automatic, Infrared detectors.

The different possible conventional methods usable for passive electronic range finding are analyzed. A new method is suggested, having considerable advantages over these. A working model to demonstrate this new method was designed and built for evaluation of experimental data and detailed descriptions are added to the report. (Author)

7. ELECTRICAL EQUIPMENT

AD-405 957 Div. 7, 20, 25, 21, 12, 17
(TISTM/PCR) OTS price $4.60

Defense Documentation Center, Cameron Station, Alexandria, Va.
POWER GENERATION.
June 63, 42p.
Unclassified report

Descriptors: *Power equipment, *Nuclear power plants, *Solar cells, *Thermoelectricity, *Piezoelectric effect, *Energy, *Bibliographies, *Abstracts, Aircraft nuclear propulsion, Nuclear propulsion, Electric power production, Submarines, Rocket propulsion, Thermonuclear reactions, Underwater propulsion, Naval vessels (Combatant), Spacecraft, Space flight, Ion engines, Icebreakers, Solar furnaces, Plasma physics, Fuel cells, Magnetohydrodynamics, Boiling water reactors, Reactor operation, Nuclear weapons, Alloys, Satellites (Artificial), Power equipment.

AD-406 106 Div. 7
(TISTM/PCR) OTS price $.75

Harry Diamond Labs., Washington, D. C.
OXYGEN SOURCES FOR FUEL CELLS.
by A. F. Forziati and D. Singman. 25 Apr 63, 29p.
Proj. 96094
HDL TR1128 Unclassified report

Descriptors: *Fuel cells, *Oxygen, *Bibliographies, Compressed air, Liquefied gases, Chemical compounds, Electrochemistry, Power, Cryogenics, Specifications, Cylindrical bodies, Volume, Weight, Containers, Materials, Barium compounds, Peroxides, Lithium compounds, Sodium compounds, Chlorates, Potassium compounds, Gas-generating systems, Design, Industrial plants, Storage, Power supplies, Batteries and components.

Commercially available gas, liquid, and chemical sources of oxygen for use with fuel cell batteries are compared. Cryogenic sources are shown to be the most efficient on a weight and volume basis. Chemical generators are satisfactory for applications requiring rather large quantities of oxygen gas at infrequent periods. Compressed gas cylinders are convenient when small quantities of oxygen are desired. A bibliography of selected publications during the past five years is included. (Author)

AD-406 131 Div. 7, 8
(TISTE/JBM) OTS price $4.60

General Electric Co., Schenectady, N. Y.
PERFORMANCE CHARACTERISTICS AND EMISSION COOLING MEASUREMENTS TAKEN ON A Cs VAPOR THERMIONIC CONVERTER WITH A THORIUM-TUNGSTEN EMITTER,
by J. M. Houston. May 63, 36p. SR1
Contract AF19 604 8424, Proj. 8659, Task 865902
AFCRL 63 450 Unclassified report

Descriptors: *Thermionic converters, *Cesium, *Power, Resistance (Electrical), Electrodes, Effectiveness, Stainless steel, Thorium alloys, Tungsten alloys, High temperature research, Electrons, Electric potential, Plasma physics, Temperature, Filaments, Space charges, Thermionic emission, Vapor pressure, Life expectancy, Electric currents, Sintering, Seals (Stoppers), Measurement, Test equipment (Electronics), Atoms, Ions, Resonance absorption, Cooling.

Measurements were made on a cylindrical, indirectly heated Cs-vapor thermionic converter having a stainless steel collector spaced 1 mm from a 13.3 sq cm Th-W emitter. At an emitter temperature of 2100 K a power output of 4.4 w/sq cm (at 1.3 v) at a measured over-all efficiency of 8.5% was observed. At 2200 K, a power output of 8.8 w/sq cm at 11.9% efficiency was observed. Measurements of the cooling of the emitter due to electron emission indicate that in the retarding range of the converter the emission cooling is just what simple theory would predict, the plasma electron temperature being equal to that of the emitter. For collector-to-emitter voltages more positive than approximately -1.3 v, the emission cooling fell far below that predicted by simple electron emission from the emitter, indicating that a large amount of power (as much as 20 w/sq cm at positive collector voltages) was flowing from the plasma back to the emitter. This anomaly in the emission cooling is interpreted in terms of resonance dradiation, excited atoms, and ions returning to the emitter. These originate in a region of high electron temperature adjacent to the emitter. (Author)

AD-406 134 Div. 7
(TISTM/BRW) OTS price $9.10

Gulton Industries Inc., Metuchen, N. J.
STATE OF CHARGE INDICATORS FOR NICKEL CADMIUM BATTERIES.
Final rept. Jan 62-Jan 63,
by M. Lurie, H. N. Seiger, and R. C. Shair.
Feb 63, 95p.
Contract AF33 657 8130, Proj. 8173, Task 817304 15
ASD TDR63 191
Unclassified report

Descriptors: *Alkaline cells, Electric currents, Electric discharge, Electrical properties, Measuring devices (Electrical and electronic), Phase meters, Nickel, Cadmium, Test sets, Test equipment (Electronics), Test equipment.

The variations of several electrical properties of nickel cadmium cells with state of charge were studied to determine the suitability of any of these for measuring state of charge. Three methods were originally proposed: measurements of ohmic resistance, microsecond transients and double layer capacitance. During the investigations two additional parameters were measured, a. c. impedance and phase shift. Double layer capacitance and a.c. impedance and transient behavior are not useful properties for determining state of charge. A phase shift system is

described which when properly calibrated predicted state of charge with an average deviation of ± 10%. Ohmic resistance measured under correct conditions showed a closer correlation to state of charge but is difficult to measure. (Author)

AD-406 179 Div. 7
(TISTE/PAR) OTS price $8.10

Times Wire and Cable Co., Inc., Wallingford, Conn.
DESIGN AND DEVELOPMENT OF IMPROVED WATERTIGHT COAXIAL CABLE.
Interim development rept. no. 2, 1 Oct-31 Dec 62. 29 June 62, 81p. ER222 B
Contract NObsr87678, Proj. SF0060306, Task 2266
Unclassified report

Descriptors: *Coaxial cables, Abrasives, Attenuation, Stability, Standing-wave ratios, Tests, Electric cables, Flammability, Electric potential, Electrical impedance, Dielectrics, Polyethylene plastics, Tables, High frequency, Very high frequency, Ultrahigh frequency, Superhigh frequency, Test equipment, Test methods, Tests, Materials, Moistureproofing.

The results of attenuation, VSWR, watertightness, stability, pliability and other tests on 33 various sample constructions show that RG-214/U, RG-217/U and RG-218/U can be redesigned to be watertight at 1000 psi and have less attenuation, better attenuation stability, be more pliable, and have better abrasion resistance than the standard designed cable. The new designs would still be compatible with the connectors presently used on the standard cables. The size of the cable can also be decreased, if desired, but then the connector would require redesign. The results presented show the technique used to manufacture the braid watertight is good for pressures greater than 2500 psi. The attenuation on all RG coaxial cable can be decreased by an improved braid design. RG-214/U, which is considered one of the better designed RG cable, has better than 20% less attenuation from 10 mc to 10 gc with the improved braid design. The pliability of a cable depends almost completely upon its jacket stiffness. Pliability results are presented that show polyurethane jacketed cables are vastly more pliable at 80 F, 0 F and -40 F than polyvinylchloride or polyethylene jacketed cables. The program for the next interval is presented. (Author)

AD-406 219 Div. 7, 25
(TISTP/AMS) OTS price $16.00

SPECTROLAB Inc., North Hollywood, Calif.
INVESTIGATION OF OPTICAL COATING FOR SOLAR CELLS.
Final rept. 1 June 61-10 Sept 62,
by R. J. Romangnoli, 10 Sept 62, 1v.
Contract DA36 039SC87449, ARPA Order 80 61
Unclassified report

Descriptors: *Solar cells, *Optical coatings, Silicon, Design, Optical filters, Mirrors, Temperature, Control, Solar radiation, Experimental data, Emissivity.

The use of concentrated and filtered solar radiation on silicon photovoltaic cells in solar power systems was investigated as a method of improving the performance and of reducing the weight and cost of such system. In connection with this study, the development of spectrally selective multilayer interference filters was undertaken. It was first necessary to study the performance of the entire system as well as the performance characteristics of solar cells and filters. The investigation indicated that the efficiency of concentration obtainable with a reflection filter depends strongly upon the spectral properties of the filter. On the basis of these studies, elementary conditions of system design for optimum performance were established. Also a basic plan was outlined for fabrication of a prototype solar system with concentration and filtering. It can be concluded from this investigation that the use of concentration and filtering can afford valuable improvements in the cost and weight of solar power systems by increasing the power per cell. (Author)

AD-406 286 Div. 7, 11
(TISTE/CAM) OTS price $2.60

Research Labs. for the Engineering Sciences U. of Virginia, Charlottesville.
RESEARCH INVESTIGATION OF MAGNETIC AND ELECTRIC FORCES FOR ROTATING SHAFT SUSPENSION.
Technical progress rept., Mar-May 63,
by B. J. Gilpin. June 63, 24p. EMI4454 114 63U
Contract AF33 657 8352
Unclassified report

Descriptors: *Bearings, *Shafts, *Resonance, Motor generators, Servomechanisms, Magnetic fields, Electric fields, Servo amplifiers, Dynamics, Torque, Load distribution, Impellers, Velocity, Rotation, Damping.

The radially passive bearing system is found to have an excessively flexible shaft. The system is rotated with an air turbine and dynamic load tests show no coupling between a pure torque load and the rigid body modes of the shaft. The completed mechanical system for the radially active bearing is given and the modified current drivers are described. The continuing analysis and experimental effort to achieve damping in the resonant magnetic bearing system are given. (Author)

AD-406 623 Div. 7, 20
(TISTE/CAM) OTS price $4.60

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
NOISE SIGNALS AND CARRIER MODULATION ARISING IN ELECTRICAL CABLES DURING NUCLEAR PULSE IRRADIATION,
by Eberhard Both, Horst P. Bruemmer, Charles P. Lascaro, Joseph Newbert, and William Schlosser.
Mar 63, 39p.
Task 3A99 15 006 01
AELRDL TR2334 Unclassified report

Descriptors: *Nuclear particles, *Electric cables, *Coaxial cables, Modulation, Transients, Electrical conductance, Electric potential, Alternating current, Electrical impedance, Measurement, Noise (Radio), Radio signals.

The electrical noise signals generated in the individual conductors of coaxial and other cables by incident nuclear radiation pulses were studied as a function of the applied voltage and the exposure history. Training processes were found to reduce the response signals in repetitive exposures, while storage or memory effects can cause strong readout signals if the applied voltage is changed in successive shots. Oscillatory signals in the center conductor were found to be caused by differentiation of the unexpectedly large shield current pulses. The latter can also inject parasitic leakage currents into other conductors

nearby. An RF signal transmitted through RG62 A/U cable suffers a temporary attenuation of almost 20%, while it passes through RG59 B/U cable unaffected. Methods for the dynamic measurement of noise, resistance, attenuation and impedance are described, and definite rules are given for minimizing noise signals from cables used in nuclear pulse radiation measurements. (Author)

AD-406 627 Div. 7, 25
(TISTP/RLG) OTS price $6.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
THEORETICAL PERFORMANCE FOR MHD GENERATORS UTILIZING NON-EQUILIBRIUM IONIZATION IN PURE ALKALI METAL VAPOR SYSTEMS,
by F. H. Shair and F. Cristinzio. Jan 63, 60p.
R62SD94
Contract AF33 657 8298
Unclassified report

Descriptors: *Magnetohydrodynamics, *Reliability, *Ionization, *Alkali metals, Inductance, Numerical analysis, Hydrostatics, Molecular association, Potassium, Temperature, Pressure, Magnetic fields, Molecular properties, Atomic properties, Elastic scattering, Nuclear cross sections, Mathematical analysis, Electron density, Power, Electrons, Plasma physics, Generators, Theory, Stability, Sublimation.

Each member of the alkali metal series was investigated to determine the best system for a closed cycle MHD generator utilizing magnetically induced non-equilibrium ionization. MHD generator performances were calculated for one-dimensional steady state flows with constant Mach number in which the dimer concentration is neglected. The calculations are for a generator with segmented electrodes. Potassium appears to be the best choice among the alkali metal series for a 1-megawatt generator operating at total temperatures near 1600 K and total pressures around 20 psia. This choice is based upon considerations of the calculated generator performance, the vapor pressure, and the equilibrium concentration of dimer in the vapor. The calculations show that the performance of an MHD generator utilizing a non-equilibrium condition of the electrons is primarily dominated by the elastic electron-neutral collision cross section. (Author)

AD-406 704 Div. 7
(TISTE/CAM) OTS price $4.60

Ion Physics Corp., Burlington, Mass.
P-N JUNCTION FORMATION TECHNIQUES.
Quarterly technical progress rept. no. 2, 20 Feb-19 May 63.
19 May 63, 41p.
Contract AF33 657 10505
Unclassified report

Descriptors: *Photoelectric cells (Semiconductor), *Solar cells, *Energy conversion, Servomotors, Rotation, Ion beams, Effectiveness, Measurement, Heat treatment, Radiation damage, Temperature, Solar spectrum, Ion bombardment.

Final tests were made on all p-on-n cells implanted in the investigation of effects of junction depth on cell performance. Indications are that it will be possible to produce cells having a good match to the solar spectrum by reducing junction depth. Cells with junction depths of 0.76 micron have a spectral response peak at 7500 Angstroms (equal energy input) vs. the usual 8500 Angstrom peak for diffusion produced p-on-n-type cells. Cell efficiency was raised to the 7-8% range under 2800 K tungsten illumination. This improvement is apparently due to changes in junction profile. It was shown that high oxygen content (> 10 to the 15th power O atoms/cc is an important factor in reducing cell performance. Reflection electron diffraction studies indicate that lattice damage caused by implantation is completely repaired with 800 C annealing for 16 hours. This heat treatment has no effect on bulk lifetime. Initial investigations on n-on-p cells were made by bombarding 0.4 ohm-cm p-type silicon with phosphorus ions. Results on unfinished cells are analogous to those for p-on-n cells. (Author)

AD-406 709 Div. 7, 8, 12
(TISTE/OHD) OTS price $11.00

Boeing Co., Seattle, Wash.
ELECTRO-INTERFERENCE TEST REPORT ON POWER SUPPLY GROUP (FIGURE A 1284),
by L. Dickson and B. Glass. 10 Sep 61, 145p.
T2 2786, Vol 1
Contract AF04 647 289
Unclassified report

Descriptors: *Power supplies, *Radiofrequency interference, Electric cables, Vulnerability, Experimental data, Test methods, Ground support equipment, Tests.

The test sample was tested. Broadband, interference tests, both radiated and conducted, were performed. Susceptibility tests were also performed. Radiated, broadband, transient interference, generated by manually operating relays and circuit breakers, exceeded the limits above 0.1 megacycles. Radiated, broadband, steady-state interference exceeded the limits between 0.5 to 1.2 megacycles in some modes. Broadband, conducted, transient interference, measured on ac and dc power leads, exceeded the limits above 30 kilocycles on some lines. Conducted, broadband, steady-state interference measured on the ac and dc power leads exceeded the limits above 15 kilocycles on some lines. Susceptibility tests indicated that the voltage of the test sample did not deviate from its normal steady-state output. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-405 909 Div. 8, 25
(TISTP/JW) OTS price $9.10

Electron Tube Research Lab., U. of Minn. Minneapolis.
STUDIES OF PRIMARY ELECTRON SOURCES.
Scientific rept. no. 5, 1 Mar-1 June 62,
by D. E. Anderson. Jan 63, 1v.
Contract AF19 604 8381, Proj. 4619, Task 46190
AFCRL 63 59 Unclassified report

Descriptors: *Cathodes (Electron tubes), *Superconductors, Oxide cathodes, Thermionic emission, Field emission, Cold cathode tubes.

A new structure for chemically reducing (BaSr)O cathodes using carbon is described. An analysis of thermal changes in cathodes under long-pulse current drain, and computer solutions to the equations resulting from the analysis, are presented, and the problem of cathode sparking is discussed in terms of the indicated thermal instability. Further studies of the dependence of cathode properties of coating thickness and of

photoemission from BaO are presented. Preparation of thin oxide films on vacuum-deposited Al and Be layers by reaction with an oxide atmosphere, and of MgO films by ion sputtering in an inert gas discharge, is described. The sputtering technique is also applied to produce Ta films as substrate materials. A system for monitoring the complex impedance of tunnel devices as a function of time and of dc bias is described. (Author)

AD-405 925 Div. 8, 5, 30
(TISTE/JBM) OTS price $8.60

Litton Systems, Inc., Waltham, Mass.
STATISTICAL INSTRUMENTATION STUDY.
Final rept.,
by A. W. Crooke, W. B. Floyd, and A. H. Nuttall.
14 Mar 63, 84p.
Contract AF30 602 2663, Proj. 4519, Task 451903
RADC TDR63 136 Unclassified report

Descriptors: *Signals, *Communication theory, Counting methods, Curve fitting, Probability, Statistical functions, Models (Simulations), Bandwidth, Taylor's series, Digital computers, Analysis, Data, Data processing systems, Instrumentation, Statistical analysis.

Several techniques for estimating n-th order statistics of signals are investigated, including curve fitting methods involving estimation of average values of functions of signal amplitudes, and success counting methods for which probabilities are estimated as the percentage time that a specified condition exists. One of the success counting methods is selected for implementation, and a breadboard model constructed. This device will calculate fourth (and lower) order joint and conditional probability density functions and distribution functions for signals with bandwidth less than 10 Kcps. Provisions are incorporated in the breadboard for calculating probability of any fourth order event in signal space, through simple and inexpensive modification of one unit in the device. (Author)

AD-405 926 Div. 8, 12, 7
(TISTE/JWS) OTS price $10.50

Boeing Co., Seattle, Wash.
ELECTRO-INTERFERENCE TEST REPORT ON POWER SUPPLY GROUP, (FIGURE 'A' 1284) SERIAL NUMBER 0004,
by C. H. Tracy. 14 May 63, 133p. T2 2786 V2
Contract AF04 647 289
Unclassified report

Descriptors: *Power supplies, *Radio interference, Electromagnetic pulses, Electromagnetic waves, Guided missiles (Surface to surface), Magnetic fields, Very low frequency, High frequency, Very high frequency, Tests.

The Test Item, Power Supply Group, DC, LF, OA-3386/GSW-4, Serial No. 0004, Boeing Part No. 25-22552-36, Figure A 1284, consists of one rack containing four 28 VDC power supplies, an AC Panel, and a DC Panel. The supplies are rated at 12A, 24A and two at 36A. The 24A supply was not included in the Test Item submitted for electro-interference tests. The purpose of this test was to determine the generated electro-interference levels and susceptibility characteristics of the Test Item. The following tests were performed: conducted interference; radiated interference, RF conducted susceptibility; magnetic induced, equipment susceptibility; and magnetic induced, cable susceptibility. (Author)

AD-405 935 Div. 8, 25
(TISTM/EJH) OTS price $2.40

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
SOLID STATE S- AND X-BAND POWER SOURCES,
by V. Boxer. Jan 63, 19p. Task 3A99 21 003 03
AELRL TR2356
Unclassified report

Descriptors: *Radiofrequency generators, *Semiconductor devices, S-band, X-band, Microwaves, Semiconductors, Stability, Diodes, Frequency, Design.

It is now possible to fabricate all semiconductor (devices) sources with usable microwave output power. Specifically, 2 watts of microwave power at S-band (3000 Mc) and 250 milliwatts at X-band can be obtained from such sources. This report describes electrical measurements made on an X-band model at USAELRDL as part of the model-evaluation program. Spurious responses are shown to be at least 24 db below the primary output; stability is better than 0.0001%. (Author)

AD-405 949 Div. 8, 26
(TISTE/PAR) OTS price $2.60

International Resistance Co., Philadelphia, Pa.
RESISTORS, FIXED FILM TYPE GENERAL PURPOSE.
Quarterly progress rept. no. 14, 1 Oct-31 Dec 62,
by Jerome G. Burns. 31 Dec 62, 14p.
Contract DA36 039SC81283
Unclassified report

Descriptors: *Fixed resistors, *Resistors, Life expectancy, Production, Tests, Moisture-proofing, Mechanical properties, Tensile properties, Noise (Radio), Resistance (Electrical), Dielectric properties, Electric insulation, Acceleration, Shock resistance, Vibration, Manufacturing methods, Reliability (Electronics).

Reliability testing (1000 C load life) is continuing with 8000 hours completed to date. Pilot run testing of the RC-20, 50 Ohm range has been completed except for Group VII shelf life. The RC-20 pilot run ranges, 10,000 Ohm, 500,000 Ohm and 300 Ohm have been produced and are ready for testing. The remaining three ranges, 100,000 Ohm, 1,000 Ohm and .27 meg Ohm, are undergoing screening tests. The first RC-07 pilot run range (50 Ohm) is in the initial stages of production. Four screening tests were incorporated into the process in order to eliminate ''sports'' and potential failures prior to pilot run testing. (Author)

AD-405 954 Div. 8, 18, 12, 6, 5
(TISTM/PCR) OTS price $1.10

Defense Documentation Center, Cameron Station, Alexandria, Va.
ELECTRONIC COUNTERMEASURES AND ELECTRONIC COUNTER-COUNTERMEASURES.
June 63, 4p.
Unclassified report

Descriptors: *Electronic countermeasures, *Electronic counter-countermeasures, *Bibliographies, *Abstracts, Telephone communication systems, Communication systems, Telegraph systems, Telephone communication systems, Radio broadcasting, Telephone equipment,

Amplifiers, Electronic equipment, Radio equipment, Radar interference, Range finding, Radio navigation, Pulse communication systems, Antiaircraft defense systems, Radio astronomy, Spacecraft, Radio interference, Rockets, Radio interference, Rockets, Radio jamming, Radar scanning, Radar stations, Electronic scanners, Satellites (Artificial), Solar radiation, X rays, Radiation measurement systems, Measuring devices (Electrical and electronic), Telemeter systems, Radio communication systems, Radar.

AD-405 968 Div. 8
(TISTE/PAR) OTS price $1.10

Osaka U. (Japan).
THE OSAKA TUBE AS AN OSCILLATOR IN THE SHORT MILLIMETER WAVES,
by A. Murai and S. Mito. 30 May 63, 9p.
Grant Nonr G001661
Unclassified report

Descriptors: *Electron tubes, *Microwave oscillators, Magnetic fields, Electric potential, Cathodes (Electron tubes), Electric currents, Electron beams, Microwave equipment, Anodes (Electron tubes), Cavity resonators, Electron tube heaters, Electron tube parts, Waveguides, Electron density, Space charges, Microwaves, Design.

A Barkhausen-Kurz type electron tube with a confining d.c. magnetic field, the so-called Osaka Tube, was designed and fabricated to operate at 2.5 mm wave length with a purpose to study the possibility of its practical fabricability. Oscillation was detected at a wavelength of 2.5 mm at a magnetic field of 4,000 gauss and an anode voltage of 800 volts. No special precision machining was adopted, and therefore the output and efficiency were not the prime purpose of this experiment other than to find the possibility of oscillation. Owing to the restricted cathode area of 0.1 mm/square, it was anticipated that at best an emission current of 1 ma would be drawn. However, actually, an emission current of 4 ma resulted, which indicates that further reduction of operating wave length may be possible. Problems still remain in the mechanical tuning construction and also in the improvement of efficiency, the solution of which lies in the precision of the machining process. (Author)

AD-405 974 Div. 8
(TISTE/PAR) OTS price $9.60

Syracuse U. Research Inst., N. Y.
TRANSIT TIME EFFECTS IN PHASED ARRAYS.
May 63, 116p.
Contract AF30 602 2646, Proj. 4506, Task 450604
RADC TDR63 67 Unclassified report

Descriptors: *Antenna radiation patterns, *Antenna configurations, Dipole antennas, Antenna lobes, Antennas, Extremely low frequency, Pulse analyzers, Electromagnetic pulses, Test equipment, Test methods, Tests, Transients, Coupled antennas.

Large linear arrays, when excited by pulses of very short duration, in the order of a few cycles, with all elements excited simultaneously, give rise to radiation patterns which have a very non-uniform side lobe structure, and result in degradation of the main lobe if the pulses are too short. This report presents a set of pulses produced at given points in space as a result of exciting an array of 49 elements, with half-wave spacing, by pulses of five cycles and less, the phase of the excitation was varied to cause the main lobe to scan through 20 degrees off boresight. The techniques for applying the results to excitations of more than five cycles were given. A family of radiation patterns are given, to show the variations in the patterns as a function of time, for the several pulse durations studied. The curves clearly show the build-up and decay of the patterns; the fluctuations in the side lobe structure, and the growth and decay of the main lobe both in width and amplitude. It was concluded that this method of excitation and lobe switching is feasible provided the minimum pulse duration is determined for the given array size and desired scan angle, based upon specified limits in main lobe degradation. Side lobe suppression could be provided by appropriate selection of amplitude distribution. (Author)

AD-405 976 Div. 8
(TISTE/OHD) OTS price $1.60

Microwave Associates Inc., Burlington, Mass.
SOLID-STATE S AND X BAND LIMITERS.
Quarterly progress rept. no. 4, 1 Jan-31 Mar 63,
by Robert Tenenholtz. 10 May 63, 11p.
Contract NObsr87307, Proj. SR0080301, ST9386
Unclassified report

Descriptors: *Limiters, *Diodes (Semiconductor), S band, Varactor diodes, Radiofrequency power, Attenuation, X band.

Single limiter capabilities of 5.0 KW and 1.0 KW at S and X-bands respectively were established with associated reasonably low values of insertion loss. By combining two of these units with 3 db hybrids, this capability can be doubled. In addition, X-band tests were successfully run up to 2.5 KW peak which indicates a further increase in power handling capability can be achieved. However, some diode development remains to be done since insertion loss for this case was 1.5 db. This value is too high with respect to the design goal of 1.0 db. (Author)

AD-406 054 Div. 8
(TISTE/JWS) OTS price $7.60

Electron Tube Research Lab., U. of Minn., Minneapolis.
STUDIES OF PRIMARY ELECTRON SOURCES.
Scientific rept. no. 6, 1 June-1 Sep 62,
by D. E. Anderson. Jan 63, 76p.
Contract AF19 604 8381, Proj. 4619, Task 46190
AFCRL 63 84
Unclassified report

Descriptors: *Oxide cathodes, *Alkali metal compounds, Dielectric films, Metal films, Thermionic emission, Photoelectric effect, Dielectrics, Semiconducting films, Thickness, Gallium, Diodes (Semiconductor), Aluminum, Aluminum compounds, Sandwich construction.

A tube structure designed to expose an oxide cathode to a controlled partial pressure of an alkaline-earth metal vapor is described and results obtained from the first tube are presented. Photoelectric yield measurements are presented which illustrate the effect of the environment on the yield from a BaO coating. The system used for the simultaneous determination of the photoelectric and thermionic emission energy distributions from BaO is presented and described in detail. Measurements of the thermionic emission energy distribution are presented and these distributions are used in an evaluation of the analyzer system. Thermionic energy distributions are presented which provide

evidence for a coating potential drop while drawing do current from the coating and a measure of the potential profile of the coating is derived from these distributions. Results of a further study of the dependence of thermionic pulse emission, conductivity, and Sr evolution on the oxide thickness are presented for a tube which operated for only a limited time. Methods of formation of insulating films for thin film tunnel current devices are discussed. A1203 was anodically formed using four electrolytic solutions, and 4 types of heat treatment were used. (Author)

AD-406 078 Div. 8, 7, 12
(TISTE/JBM) OTS price $8.60

Coordinated Science Lab., U. of Illinois, Urbana.
AN OPTIMIZATION TECHNIQUE FOR PULSE WIDTH MODULATED SYSTEMS,
by Robert William Kafka. May 63, 92p. R163
Contract DA36 039AMC02208, DA Proj. 3A99 25 004
Unclassified report

Descriptors: *Pulse modulation, *Control systems, Mathematical models, Linear systems, Statistical functions, Control sequences, Digital computers, Control simulators, Analysis, Attitude control systems, Vector analysis, Programming (Computers), Statistical processes, Matrix algebra.

A procedure for the design of a controller to optimize a certain class of pulse-width-modulated systems is presented. The process to be controlled is time-invariant, of arbitrary order, and excited by a sequence of pulses generated from information available at arbitrary sampling instants. Input information to the system is quite general and includes random and deterministic phenomena. Identification of the plant is accomplished using state variable notation and linear estimation techniques. Prediction of the future plant behavior is also performed with these techniques and the controller is designed to optimize the predicted plant performance by minimizing a measure of the future system errors. The mechanized optimal control law or controller program, develops the pulse to be applied at any sampling instant by specifying the pulse width and associated sign. The general results are applied to several examples through digital computer simulation. The optimal pulse width controller is shown to produce far better performance than normal pulse width control which utilizes present errors to develop the actuating signal to be applied at that same instant and for some time in the future. The results of considering a family of step function inputs to the system are shown for a third and fourth order plant. (Author)

AD-406 084 Div. 8, 30
(TISTE/PAR) OTS price $13.00

Philco Corp., Willow Grove, Pa.
SUBSYSTEM SS1A.
Final engineering rept., 1 July 60-31 Dec 62 and Addendum covering the period 1 Jan-1 May 63,
by H. I. Glazer. 1 May 63, 1v,
Contract DA36 039sc85146
Unclassified report

Descriptors: *Data processing systems, *Computers, Programming languages, Mobile, Digital systems, Design, Data transmission systems, Fire control computers, Fire control systems, Computer logic, Vibration, Fire control system components, Computer storage devices, Input-output devices, Circuits, Semiconductor devices, Printed circuits, Data storage systems, Punched tape, Digital computers, Programming (Computers), Magnetic core storage, Magnetic tape, Communication systems, Power supplies, Punched cards, Display systems, Transistors, Artillery units.

The design and fabrication of automatic data processing subsystems (SS1A) for field artillery applications are described. Each subsystem consists of a modified BASICPAC system together with external facilities for automatic entry, transmission, and display of fire-control information. A detailed list of specific items included in each SS1A is presented. A short history of the SS1A project is given. Under the heading of logical design, the five major changes (sign storage change, MAB change, timing counter change, non-FIELDATA equipment change, control separation change) affecting the logical structure of the system are briefly described. The circuit design section only deals with the 'temperature fix change' and the clock pulse shaper change. This report includes three final reports by sub-contractors for the SS1A peripheral equipment.

AD-406 089 Div. 8, 26
(TISTE/JWS) OTS price $2.60

Western Electric Co., Laureldale, Pa.
PRODUCTION ENGINEERING MEASURES. HIGH FREQUENCY TRANSISTOR.
Quarterly progress rept. no. 6, 20 Dec 62-20 Mar 63,
by T. G. Stoudt. 20 Mar 63, 18p.
Contract DA36 039sc85969
Unclassified report

Descriptors: *Transistors, Germanium, Epitaxial growth, Vacuum apparatus, Vapor plating, Ultrahigh frequency, Diffusion, Bonding, Gain, Power, Impurities, Arsenic, Antimony, Manufacturing methods.

Engineering effort was devoted to the following areas: developing improvements in epitaxial substrate material; developing improvements in diffusion of epitaxial material; continued evaluation of practical techniques and tooling for evaporation and wire bonding processes; continued discussions on a proposed Test Specification with representatives of U. S. Army Electronics Research & Development Laboratory, U. S. Army Electronics Materiel Support Agency, and U. S. Army Electronics Materiel Agency. (Author)

AD-406 095 Div. 8
(TISTE/CAM) OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
BACKFIRE ANTENNAS FOR SHF, UHF, AND VHF BANDS,
by J. A. Strom and H. W. Ehrenspeck. Apr 63, 19p.
Proj. 5635
AFCRL 63 114
Unclassified report

Descriptors: *Dipole antennas, Antennas, X band, S band, Very high frequency, Ultra high frequency, Superhigh frequency, Antenna lobes, Antenna radiation patterns, Antenna feeds, Antenna components, Gain, Attenuators, Measurement, Test equipment, Model tests, Reflectors.

The application of the backfire principle to endfire antennas increases their gain by 4 to 6 db over that of the original gain-maximized array. Basic investigations are described on a 9080-Mc backfire antenna which was converted from an optimized Yagi antenna. Backfire antenna

models have been successfully tested at frequencies of 3000, 600, and 220 Mc. The design procedure and physical dimensions are given for all models. A method for building backfire antennas with gain figures up to 25 db is discussed. (Author)

AD-406 101 Div. 8, 25
(TISTP/JW) OTS price $5.60

Columbia Radiation Lab., New York.
RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM.
Quarterly progress rept. no. 1, 16 Dec 62-15 Mar 63,
by R. Novick. 15 Mar 63, 53p. CU3 63SC90789
Contracts DA36 039sc90789 and Nonr26645,
Proj. NR372 101, Task 3A99 20 001 09
Unclassified report

Descriptors: *Electronics, Atomic properties, Frequency analyzers, Magnetic properties, Quadrupole moments, Resonance, Optical materials, Masers, Lithium.

A detailed study was made of the metastable lithium atom. The threshold energy, production cross section, and lifetime are determined. These values are in reasonably good agreement with the theoretical calculations. The fine structure splitting of the 3P term of the lithium atom has been determined by level crossing spectroscopy. The observed interval is 2880 Mc/sec and is about 12% smaller than the corresponding splitting. Precise knowledge of fine structure will provide a critical test of three electron wave functions. The spin, magnetic moment and quadrupole moment of Cd113m have been determined by optical double resonance. Computational techniques have been developed for the evaluation of fine structure corrections to the level crossing fields in (sp) configurations. A new electric resonance molecular beam apparatus has been constructed and will be used for the study of molecular structure. A new high temperature microwave absorption spectrometer has been constructed and used for the determination of the rotational structure of LiCl. This spectrometer is unique in that it employs a nitrogen buffer gas to reduce the rate of contamination of the microwave windows and Stark plate insulators. An optical maser has been used for the precise determination of the frequency shifts of the light scattered by an acoustically excited liquid (Debye-Sears effect). (Author)

AD-406 107 Div. 8
(TISTE/JWS) OTS price $.75

Harry Diamond Labs., Washington, D. C.
A MICROMINIATURE AMPLIFIER WITH THIN-FILM PASSIVE PARTS,
by B. Mermelstein and W. C. Boesman. 26 Apr 63, 29p.
Proj. 94892
HDL TR1119 Unclassified report

Descriptors: *Amplifiers, *Transistor amplifiers, Metal films, Dielectric films, Vacuum apparatus, Vapor plating, Gain, Transistors, Capacitors, Resistors, Aluminum, Glass, Nickel alloys, Chromium alloys, Silicon, Monoxides, Microminiaturization (Electronics), Intermediate frequency amplifiers.

A microminiature 30-Mc IF amplifier stage was fabricated from vacuum-deposited thin-film passive components and two inserted parts. The vacuum-deposited parts, thin films of nickel-chromium, aluminum, and silicon monoxide, were laid down for use as resistors, conductors and dielectrics, respectively. In the deposition processes, dimensionally accurate masks are essential and they were achieved by the use of a spark erosion technique. A specially designed mask-and-substrate holder accurately indexed the masks relative to the substrates. Three models of this amplifier were made but one could not be used due to a short in the circuit. The other two circuits showed gains of 16.5 and 14.7 db. When one circuit was retested after storage in a desiccator for one year at room temperature, the gain was 15.1 db. (Author)

AD-406 111 Div. 8, 26
(TISTE/JBM) OTS price $5.60

International Resistance Co., Philadelphia, Pa.
PRODUCTION ENGINEERING MEASURE FOR HIGH RELIABILITY, FIXED, FILM, PRECISION, RESISTORS.
Quarterly progress rept. no. 1, 21 Dec 62-21 Mar 63,
by Richard C. Wagner. 21 Mar 63, 1v.
Contract DA36 039AMC01461e
Unclassified report

Descriptors: *Fixed resistors, Reliability (Electronics), Films, Manufacturing methods, Ceramic materials, Costs, Processing, Special purpose computers, Programming (Computers), Industrial equipment, Helium, Glass seals, Metal films, Nitrogen, Gases, Production.

Efforts concerned the establishment of a production engineering measure for high reliability, fixed, film, precision resistors suitable for use in the Minuteman program. Design of a subassembly machine is well under way and estimated as being 20% complete. This design will perform three subassembly operations on one piece of equipment. A ceramic evaluation program is underway with the receipt of the ceramic pieces and the units are going through the manufacturing process. A helium-nitrogen study was outlined and time scheduled with production for the manufacture of devices. A new spiralling techniques investigation was started with the formulation of tests to determine the effect of mechanized handling on the metallized substrate. (Author)

AD-406 196 Div. 8, 25, 26
(TISTM/EJH) OTS price $5.60

Hp Associates, Palo Alto, Calif.
INVESTIGATION OF HOT ELECTRON EMITTER.
Scientific rept. no. 3, 1 Dec 62-28 Feb 63.
28 Feb 63, 1v.
Contract AF19 628 1637, Proj. 4608, Task 460804
AFCRL 63 113 Unclassified report

Descriptors: *Transistors, *Diodes (Semiconductor), *Semiconductors, Photoelectric effect, Silicon, Gold, Gallium compounds, Arsenides, Triodes, Sandwich construction, Manufacturing methods, Electrical properties, Electric potential.

Electrical properties of gold-silicon barriers were studied in some detail. The reverse leakage current of these barriers is shown to be caused by lowering of the barrier due to the image force effect. The thermal activation energy of the saturation current was found to be 0.799 eV, identical to the height of the Au-Si barrier. The barrier height, saturation current density, and ideality of Pt, Pd, Ag, Ni and Cu barriers to Si are presented. Two methods for fabricating hot electron triodes are described.

Large area structures, made by pressing together a silicon-gold-silicon sandwich, do not exhibit triode characteristics and are limited by particulate matter and deviations from flatness. Triodes with point contact emitters of silicon and gallium arsenide were fabricated and their current-voltage characteristics are presented. Current transfer ratis s as high as 0.75 were observed. (Author)

AD-406 211 Div. 8, 31
(TISTE/JBM) OTS price $1.60

Airtron, Inc., Morris Plains, N. J.
AN IMPROVED BROADBAND LOW LOSS TRANSMISSION LINE SYSTEM TO BE INSTALLED WITHIN A RETRACTABLE SUBMARINE MAST.
Interim development rept., 1 Jan-31 Mar 63,
by Robert Q. Maines. 31 May 63, 18p.
Contract NObsr87676, Proj. SS021001, Task 9025
Unclassified report

Descriptors: *Submarine antennas, *Waveguides, *Antenna masts, Coaxial cables, Adapters, Waveguide windows, Standing wave ratios, Broadband, Superhigh frequency, Antenna components, Couplings, Seals (Stoppers), Transmission lines.

Efforts were continued on the development of an improved transmission system for use in a submarine mast. The ALB-134 ridged waveguide and the optimum size Splinaline coaxial cable were received. A 1-in.-radius 90 degree coaxial bend was fabricated and tested. This bend, in conjunction with a 90 degree coax-to-ridge waveguide adapter, will form the end-fired configuration needed at the top of the mast. The design of the coupling plate and rail assembly needed for a continuously operating system over a 6 foot range was completed and parts were fabricated. The design of the pressure windows was completed. A 50 ohm model, which will be used for both bands, was built, electrically tested and certified at 7000 PSI. A graph of VSWR versus frequency is shown. The 50 to 70 ohm transition was designed. An improved 50 ohm flexible cable was located which can reduce the loss in the line by 50%. (Author)

AD-406 218 Div. 8, 15, 25
(TISTE/JBM) OTS price $8.10

Stanford Research Inst., Menlo Park, Calif.
COUPLED MODE THEORY FOR ADVANCED MICROWAVE DEVICES.
Interim rept. no. 4,
by M. C. Pease. May 63, 78p.
Contract AF33 657 8343, SRI Proj. 4052
Unclassified report

Descriptors: *Microwave equipment, *Propagation, *Wave transmission, *Traveling wave tubes, Functions, Theory, Vector analysis, Mathematical analysis, Electron beams, Matrix algebra, Electrical impedance, Focusing, Communication theory, Analysis, Parametric amplifiers, Coupling circuits, Field theory.

Research was continued on the development and application of a generalized theory of the effects of coupling the modes of propagation such as occur in distributed microwave devices. The entire work done so far in this study is reviewed. This review is in descriptive, rather than mathematical, terms to indicate the purposes and interrelations of the various parts of the program. An analysis of the class of non-uniform systems that were studied is presented. This is the class of systems such that the derivative of the system matrix is expressible as a commutator of the system matrix with another operator. This class includes many of the interesting non-uniform systems, and it is a class that is tractable for analysis. This analysis was extended in several directions. Certain simpler subclasses are studied in detail. The 2 by 2 case with hermitian system matrix is discussed first, and then the general 2 by 2 case. The class of systems such that the system matrix can be regarded as embedded in a space that is a representation of the general rotation group is then studied. Two formalisms are used, one using the infinitesimal transformations of the rotation group, and the other the corresponding spin matrices. The results are equivalent, but the difference of form may be useful. (Author)

AD-406 233 Div. 8, 30
(TISTE/JWS) OTS price $6.60

Physical Science Lab., New Mexico State U., University Park.
AN ANTENNA RADIATION PATTERN MEASURING RESEARCH INSTRUMENT,
by H. W. Haas. 1 Apr 63, 55p.
Contracts NOrd16710 and NAS5 503
ARO AROD2936 1 Unclassified report

Descriptors: *Ranges (Establishments), *Antenna radiation patterns, Helical antennas, Calibration, Antenna masts, Test sets, Polarization, Models (Simulations), Microwaves, Antenna components, Positioning devices (Machinery), Antennas, Instrumentation.

The general aspects of a multipurpose antenna radiation pattern measuring instrument designed, fabricated, instrumented and placed in operation during the early part of 1962 are covered. Initial planning began in late 1958 when it was apparent that the need for such an instrument was evident to support present and future electromagnetic programs of national interest. It is one of the finest antenna ranges in the country today and is expected to serve the country's needs for many years to come. (Author)

AD-406 252 Div. 8, 25
(TISTM/ODN) OTS price $1.60

Rutgers U., School of Chemistry, New Brunswick, N. J.
SORPTION OF HYDROGEN BY GLASSES AND CERAMICS.
Quarterly progress rept. no. 1, 1 Feb-30 Apr 63,
by M. J. D. Low. 30 Apr 63, 12p.
Contract DA36 039AMC02170, Task 3A99 13 003 02
Unclassified report

Descriptors: *Electron tubes, *Thyratrons.

This report is concerned with the procurement of components and the construction of apparatus suitable for the measurement of the kinetics of sorption of hydrogen and deuterium by glasses and ceramics and of the infrared spectra of the molecular structures thus formed. (Author)

AD-406 256 Div. 8, 26
(TISTE/JWS) OTS price $9.10

Clevite Transistor Products, Waltham, Mass.
PRODUCTION ENGINEERING MEASURE FOR THE IMPROVEMENT OF GERMANIUM ALLOY POWER TRANSISTORS.
Quarterly progress rept. no. 3, 31 Oct 62-31 Jan 63.
31 Jan 63, 1v.
Contract DA36 039sc86724
Unclassified report

Descriptors: *Transistors, *Manufacturing methods, Germanium, Reliability (Electronics), Life expectancy, Welding, Oxides, Silanes, Coatings, Dessicants, Power, Transistors.

Life test results on jet rinsed transistors are discussed. Initial and life test results are presented for transistors on which surface passivation by oxidation was attempted. A new method was proved out for introducing helium into the welded transistor for purposes of leak detection. In the course of work on the activation of our present dessicant, CaSO4, it was found that molecular sieve pellets give superior results, particularly during high temperature storage. Results are given for approximately 1,000 transistors with ten mil thick collectors versus about 750 transistors with standard five mil collector. Prototype jigs were designed and built which will reduce by a factor of three the number of times an unwelded transistor is handled from final surface treatment to welding. A homogeneous lot of 3,000 transistors was manufactured and put on 90 degrees, 125 degrees, and 145 degrees C storage test, elevated temperature cut-off test and step-stress test. Results are presented and failure modes are discussed. (Author)

AD-406 268 Div. 8
(TISTE/JWS) OTS price $3.60

General Electric Co., Owensboro, Ky.
RESEARCH, DEVELOPMENT, AND FABRICATION OF TUNNEL EMISSION CATHODES.
Quarterly rept. no. 3, Jan-Mar 63,
by J. W. Hall, II. Mar 63, 29p.
Contract DA49 186ORD1053
Unclassified report

Descriptors: *Cathodes (Electron tubes), *Semiconducting films, Aluminum, Glass, Silicates, Sandwich construction, Gold, Electron microscopy, Dielectric films, Surface properties, Semiconductors, Vapor plating.

Research was continued on tunnel emission cathodes with emission current densities up to 740 micron ampere per square cm were obtained. The transmission coefficients (emission current/film current) ranged between one times ten to the minus four and ten to the minus eight powers. The mechanism by which electrons are transferred from the emitter layer to the accelerator layer is not clear from the data. In some cases, it appears as though tunnel emission occurred, while in other cases it appeared as though thermionic or Schottky emission occurred. In all cases, the units either shorted or opened after several testing cycles. The failure is probably due to the accumulation of heat at the junction due to the poor heat sink conditions. Several approaches to provide a heat sink are being studied. Transmission electron microscopy is being used to study the emitter and accelerator films, and X-ray fluorescence is being used to determine film thickness. Testing has been conducted under d-c and pulse conditions. (Author)

AD-406 305 Div. 8, 25, 26
(TISTP/MFA) OTS price $2.60

Knights, James, Co., Sandwich, Ill.
VHF QUARTZ CRYSTAL UNITS CR-(XM-38)/U 150 MC TO 200 MC.
Formal rept. no. 5, 1 Oct-31 Dec 62.
31 Dec 62, 23p.
Contract DA36 039sc85973
Unclassified report

Descriptors: *Quartz capacitors, *Very high frequency, Capacitors, Electrodes, Quality control, Resistance (Electrical), Aluminum, Etched crystals, Production, Inductance, Tests, Single crystals, Measurement.

The purpose of this effort is to develop techniques necessary to fabricate and evaluate 9th overtone units from 150 mc to 200 mc. The problems are: (1) meeting the maximum series resistance specification of 80 ohms after adjustment to frequency; (2) correlation of final frequency adjustment to the actual frequency as measured in the TSM-15; and (3) optimizing yields sufficient to adhere to the requirement of 'minimum shrinkage.' Data on 150- and 174-mc 9th overtone units, employing different electrode sizes is given. First efforts to adjust to frequency by etching the aluminum electrodes are reported. Data is given on holder resistance and inductance. (Author)

AD-406 318 Div. 8, 25
(TISTP/FEM) OTS price $5.60

Columbia Radiation Lab., New York.
RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM.
Quarterly progress rept. no. 1, 16 Dec 62-15 Mar 63,
by R. Novick. 15 Mar 63, 53p. CU3 63
Contract DA36 039sc90789, Proj. NR372 101, Task 3A99 20 001 09
Unclassified report

Descriptors: *Helium, *Lithium, *Optical filters, *Spectroscopy, Vacuum apparatus, Measurement, Experimental data, Detection, Optical phenomena, Isotopes, Hyperfine structure, Nuclear spins, Magnetic moments, Superhigh frequency, Extremely high frequency, Magnetrons, Cryogenics, Infrared optical materials, Masers, Lasers, Design, Solid state physics, Radioactivity, Radioactive isotopes, Ionization, Excitation, Spectrum analyzers, Resonance.

A detailed study was made of the metastable lithium atom. The fine structure splitting of the 3P term of the lithium atom was determined by level crossing spectroscopy. The observed interval is 2880 mc and is about 12% smaller than the corresponding splitting. Precise knowledge of fine structure will provide a critical test of three electron wave functions. The spin, magnetic moment and quadrupole moment of Cd-113m were determined by optical double resonance. Computational techniques were developed for the evaluation of fine structure cons to the level crossing fields in (sp) configurations. A new electric resonance molecular beam apparatus was constructed and will be used for the study of molecular structure. A new high-temperature microwave absorption spectrometer was constructed and used for the determination of the rotational structure of LiCl. This spectrometer is unique in that it employs a nitrogen buffer gas to reduce the rate of contamination of the microwave windows and Stark plate insulators. An optical maser was used for the precise determination of the frequency shifts of the light scattered by an acoustically exciteed liquid (Debye-Sears effect). (Author)

AD-406 323 Div. 8, 25
(TISTP/RLG) OTS price $1.10

Quantum Electronics Lab., Calif. Inst. of Tech., Pasadena.
MULTI-REFLECTOR OPTICAL RESONATORS,
by Peter O. Clark. 10 Apr 63, 6p. RN SR3
Contract AF19 604 8052, Proj. 4600, Task 460006
AFCRL 63 115
Unclassified report

Descriptors: *Resonators, *Reflectors, *Lasers, Mirrors, Optics, Stability, Simultaneous equations, Difference equations, Optical instruments, Analysis, Interferometer.

This note describes an analysis based on geometrical optics which determines the conditions for stable operation of devices employing lasers. The same procedure may also be applied to the investigation of mode selection in toroidal ruby lasers by periodic variations in the reflectivity of the toroid surface. Investigation of optical resonators other than the two-mirror resonator with plane or spherical reflectors, has shown that the geometrical optics of cavities with more than two reflectors can be treated in a manner similar to that of Pierce and Boyd and Kogelnik. (Author)

AD-406 325 Div. 8, 25, 9
(TISTP/JW) OTS price $3.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
HIGH-TEMPERATURE VAPOR-FILLED THERMIONIC CONVERTER.
Quarterly technical progress rept. 30 Apr 63, by W. Godsin and R. Skoff. 17 May 63, 34p.
GA4258
Contract AF33 657 8563, Proj. 8173, Task 817305 5
Unclassified report

Descriptors: *Thermionic emission, Electrolytic cells, Gases, Electron beams, Test methods, High temperature research.

Filament failure and power degradation forced discontinuation of some of the testing. Post-operative analysis revealed that the remaining emitter thermocouple had maintained its calibration and that vacuum emission currents were at least equal to the pre-lifetest values at high emitter temperature but exceeded the pre-lifetest values at lower emitter temperatures. A large leak was found in the emitter cavity, which explained the loss of cesium and the resulting power degradation as well as the erosion of the filament and filament holder. Chemical analysis of the emitter showed a loss of about 75% of the uranium. A structure rish in tantalum carbide had formed at the tantalum carbide interface and had penetrated the entire tantalum substrate. A theoretical study of cell contamination by fission products revealed that the fate of any one of the many elements may differ widely from that of others. The noble gases krypton and xenon presumably will have the least detrimental effect in a vented system. The electronegative fission products tend to combine with the cesium to some extent. Since the cesium reservoir will be at the lowest temperature in the cell, most of the condensates of the fission products should collect there. The remaining fission products will condense on the various components of the cell. (Author)

AD-406 353 Div. 8
(TISTE/JWS) OTS price $4.60

Westinghouse Electric Corp., Pittsburgh, Pa.
WEBBED DENDRITIC SILICON SOLAR CELL RADIATION EFFECTS INVESTIGATION.
Quarterly progress rept., 15 Jan-15 Apr 63, by K. S. Tarneja, R. V. Babcock and R. D. Lamb. 15 Apr 63, 36p. 63 927 534R1
Contract AF33 657 10527
Unclassified report

Descriptors: *Solar cells, Resistance (Electrical), Silicon, Radiation damage, Crystal growth, Boron, Diffusion, Photoengraving, Spectrophotometers, Electron beams, Radiation effects.

Initial work toward maximizing the radiation resistance of silicon webbed dendritic solar cells is discussed. Design considerations, techniques for fabricating cells of 1 ohm cm resistivity, and steps preparatory to radiation damage study are presented. Efficiencies as high as 12.4% were achieved on solar cells made from 1 ohm-cm n-type silicon webbed dendrites. (Author)

AD-406 465 Div. 8, 26
(TISTE/OHD) OTS price $26.00

Western Electric Co., Laureldale, Pa.
PRODUCTION ENGINEERING MEASURE. MECHANIZATION FOR 2N559 AND 2N1094 TRANSISTORS. PHASE 1.
Final engineering rept., 30 Apr 59-31 Dec 62, by M. N. Reppert. 31 Dec 62, 505p.
Contract DA36 039sc72729
Unclassified report

Descriptors: *Transistors, *Manufacturing methods, Production, Machines, Automation, Cleaning, Plating, Welding, Bonding.

During development of the Nike Zeus anti-missile missile, it became apparent that large quantities of 2N559 and 2N1094 transistors would be needed as part of this system. Production was expanded to provide mechanized equipment for high-volume production of 2N559 and 2N1094 transistors. During Phase 1 of the 2N559-2N1094 Mechanization Program, 22 machines for 20 manufacturing operations were built. This report reviews the work done during Phase 1, April 30, 1959 to December 31, 1962, while developing and testing the machines. Each mechanized operation is described; problems encountered during development and operation of the machine are reviewed; mechanized operations are evaluated; and recommendations for further developments and refinements are presented. A 2N559 pilot production run and four mechanized production runs - for 2N560, 2N1051, 2N1094, and 2N1195 transistors - demonstrated the production capability of the mechanized line. Distribution of Group A electrical parameters and summaries of Group B tests presented in this report indicate the quality of the five transistor types as Phase 1 ended. (Author)

AD-406 611 Div. 8
(TISTE/JWS) OTS price $3.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
THE GENERAL THEORY OF NON-RECIPROCAL DIRECTIONAL COUPLERS AND APPLICATIONS IN TWR CIRCUITS,
by Henry Berger. 4 Mar 63, 1v. PIBMRI1110 63
Contract AF30 602 2135
RADC TDR63 144 Unclassified report

Descriptors: *Waveguide couplers, *Resonators, Matrix algebra, Ferrites, Dummy loads, Transmission lines, Difference equations, Reflection, Traveling-wave tubes.

An analysis of non-reciprocal directional couplers and their application in traveling-wave resonant (TWR) circuits is presented. The general characteristic of this type of coupler is determined from an examination of its scattering matrix. One result of interest is that it is not necessary that there be a pi/2 phase difference between the output waves of the coupler resulting from a single input wave. This phase difference is necessary for symmetrical couplers. One type of non-reciprocal directional coupler is examined, and the various elements of the scattering matrix are related to its physical parameters. The non-reciprocally-coupled TWR circuit is analyzed for steady state and transient behavior, with and without the presence of reflections in the closed loop of the circuit.

It is demonstrated that a variable non-reciprocal coupler can serve three functions simultaneously: (1) isolate the power source from amplified ring reflections and hence permit stable tuning of the circuit; (2) isolate the ring from the waves reflected from the dummy load; and (3) act as a variable coupler which is needed to tune the circuit. From the manner in which the non-reciprocal character is permitted to occur, it is conjectured that it is not possible to devise a TWR circuit which makes use of any arrangement of 4-port directional couplers of any type which can store in the forward-ring wave all the energy supplied by the source.

AD-406 628 Div. 8, 5
(TISTE/PAR) OTS price $2.60

American Electronic Labs., Inc., Colmar, Pa.
RF PREAMPLIFIER AND CONVERTER FOR TEST AND EVALUATION.
Final engineering rept.
20 Aug 62, 17p.
Contract ARDS609
Unclassified report

Descriptors: *Preamplifiers, *Radiofrequency filters, *Frequency converters, Resonators, Bandwidth, Frequency dividers, Frequency multipliers, High frequency, Design, Radiofrequency, Intermediate frequency, Intermediate frequency amplifiers, Radiofrequency amplifiers, Radiofrequency cables, Radio receivers, Cavity resonators, Mixers (Electronic), Oscillators, Very high frequency.

The AEL RF Preamplifier and Converter, ARDS Type 111-24D, is an adapter unit to be used in conjunction with presently-used VHF receivers. The unit is fixed-tuned and operates from 108 to 152 mc. It will enable the VHF receiver to be used on channels requiring 50 kc channel separation. The AEL RF Preamplifier and Converter has a highly selective RF front end which yields very low cross-modulation and high selectivity. The unit is powered from 115 volts ac, 60 cycles. The basic feasibility of the unit was established and found to have satisfactory performance. All components and techniques could be made to meet low cost production standards. The limitation of a physical height of 1-3/4 in. prevented the use of large resonators with the resulting higher Q in the RF input filter. (Author)

AD-406 632 Div. 8
(TISTE/JWS) OTS price $8.10

Technical Research Group, East Boston, Mass.
EFFICIENT FLUSHMOUNTED SURFACE WAVE LAUNCHER,
by Mats E. Viggh. 28 Nov 62, 86p. SR4
Contract AF19 604 8057, Proj. 4600, Task 460002
AFCRL 63 63 Unclassified report

Descriptors: *Slot antennas, Mathematical prediction, Antenna radiation patterns, Horn antennas, Antenna feeds, Antenna lobes, Dipole antennas, Vector analysis, Electromagnetic properties, Gain, Test equipment (Electronics), Electromagnetic waves.

Various methods for launching surface waves are reviewed, and the basic design principles are outlined for different kinds of launchers. The case of a slot in a dielectric-clad groundplane is analyzed in detail, and experiments supporting the calculated results are reported. A way of combining several slots for good launching efficiency is derived and a five-slot launcher designed after this principle is described. Results from measurements of radiation patterns and efficiency are reported; as well as from measurements of radiation patterns from discontinuities on a surface waveguide excited by this launcher in combination with a cylindrical parabolic reflector. In particular, a launching efficiency of over 80% was achieved with five slots, as compared to about 48% with one slot. Radiation patterns due to abrupt changes in dielectric thickness were measured, and compared with theoretical results for a corresponding change in surface reactance. The agreement was good at least within the main lobe. (Author)

AD-406 697 Div. 8, 15, 30
(TISTE/PAR) OTS price $8.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
ANALYSIS AND SYNTHESIS OF SEQUENTIAL SWITCHING CIRCUITS,
by Zvi Kohavi. June 63, 88p. RR PIBMRI 1090 62
Grant AFOSR62 295
AFOSR 4718 Unclassified report

Descriptors: *Sequence switches, *Switching circuits, Sequential analysis, Sequences, Synchronization (Electronics), Synchronizing switches, Electronic switches, Theory, Analysis, Matrix algebra, Algebra, Mathematical logic, Computer logic, Mathematical analysis, Design, Programming (Computers), Statistical analysis, Statistical functions, Synthesis.

Two of the most difficult problems in the synthesis of the sequential switching circuits are discussed: the problem of simplifying the flow tables of completely and incompletely specified switching functions; and the problem of assigning the secondary variables to the different states of the circuit. A graphical method is developed for the reduction of the number of states in the sequential machine. The method simplifies the techniques of finding the closed sets of compatibles which from the new set of states of the reduced machine. The last chapter includes further development of existing methods for the secondary assignment for both synchronous and asynchronous sequential machines. A discussion is also given on the decomposition of sequential machines and its relations to the secondary assignment. (Author)

AD-406 780 Div. 8, 18
(TISTE/JWS) OTS price $23.50

Electronic Systems Div., Air Force Systems Command, Bedford, Mass.
PROCEEDINGS OF ESD MAINTAINABILITY CONFERENCE, 12-13 MARCH 1963.
1963, 1v.
ESD TDR63 325 Unclassified report

Descriptors: *Weapons systems, *Maintainability, *Electronic equipment, *Symposia, Reliability, Reliability (Electronics), Design, Military requirements, Human engineering, Redundant components, Mathematical models, Specifications, Communication systems, Guided missiles (Surface to surface).

AD-406 782 Div. 8
(TISTE/JWS) OTS price $.50

Naval Research Lab., Washington, D. C.
SEA WATER BATTERY PLUS TUNNEL DIODE CONVERTER AS A POWER SOURCE.
Final rept.,
by J. M. Marzolf. 22 May 63, 4p.
Projs. RR010 01 44 5601; SF013 06 29, Task 2857; SR007 12 01 0800
NRL 5961 Unclassified report

Descriptors: *Inverters, *Tunnel diodes, *Water activated batteries, Feasibility studies, Beacon lights, Magnesium, Germanium, Buoys, Sea water.

To fill the need for a low-power, reliable, long-duration, maintenance-free power source for remote marine applications, the combination of a single cell sea water battery with a tunnel diode converter to step up the voltage is proposed. The devices should be designed for integration as a single unit for a given load and lifetime. The sacrificial anodes used in the battery can be replaced after they have been expended, but the static converter can be re-used indefinitely. The compatibility of the magnesium-iron sea water battery and tunnel diode converter has been demonstrated as a practical power source. It would have applications for powering remote buoys or oceanographic instrumentation. As a power source for radio distress transmitters for small boats or ditched aircraft, it would be particularly attractive because of an indefinite shelf lift. (Author)

AD-406 784 Div. 8
(TISTE/JWS) OTS price $2.60

Sylvania Electric Products, Inc., Buffalo, N. Y.
DEVELOPMENT OF C- AND X-BAND POWER GENERATORS.
Quarterly rept. no. 3, 1 Dec 62-28 Feb 63,
by R. McIntyre. 1 Apr 63, 25p. A35 5 5 0 25
Contract DA36 039sc90757

Unclassified report

Descriptors: *Power amplifiers, *Transistor amplifiers, C band, X band, Frequency multipliers, Varactor diodes, Electric bridges, Power, Harmonic oscillators, Distortion, Transistors.

Implementation of the indirect power generation technique employing a transistorized exciter and a cascaded chain of six frequency multipliers was continued during this period. The feasibility of obtaining a transistorized exciter output of 60 w at 156 mc to drive the cascaded chain of frequency multipliers was verified. Design of the intermediate- and high-power amplifiers was completed. Marriage testing of the transistorized exciter modules was performed and the desired power output of 60 w was achieved using the breadboard models. The bridge-type circuit was successfully implemented in the lumped-element and distributed-element harmonic generators. A conversion efficiency of -1.75 db was obtained for a four-diode bridge doubler with an output power of 27.2 w at an input frequency of 156 mc; a conversion efficiency of -3.8 db has been obtained for a two-diode bridge doubler circuit with an output power of 3.3 w at an input frequency of 1.25 gc. Efforts to increase the efficiency of the high-frequency multiplier are continuing. (Author)

9. FLUID MECHANICS

AD-405 913 Div. 9
(TISTP/JW) OTS price $5.60

Notre Dame U., Ind.
BOUNDARY LAYER TRANSITION,
by F. N. M. Brown. May 63, 1v.
Contract NOrd17702

Unclassified report

Descriptors: *Boundary layer transitions, Wind tunnels, Photographic processes, Stroboscopes, Laminar boundary layer.

A determination of the mechanism of transition in a single pressure gradient is made by means of high-speed motion picture photography. A comparison is made of hot wire and stroboscope techniques used for the determination of the frequencies of the organized motion that preceeds transition. (Author)

AD-406 073 Div. 9
(TISTP/FEM) OTS price $9.60

Princeton U., N. J.
THE TWO-DIMENSIONAL, TURBULENT WALL JET WITH AND WITHOUT AN EXTERNAL FREE STREAM,
by A. Verhoff. May 63, 49p. 626
Contract Nonr85814

Unclassified report

Descriptors: *Two-dimensional flow, *Jet mixing flow, Theory, Velocity, Shear stresses, Distribution, Reynolds number, Nozzles, Pressure, Integral equations, Partial differential equations, Experimental data, Turbulence.

A theoretical as well as an experimental investigation of a plane, two-dimensional, turbulent wall jet is presented. The velocity profiles are described by means of an asymptotic expansion and the growth of the jet and decay of maximum velocity are also predicted. (Author)

AD-406 097 Div. 9, 22
(TISTP/WH) OTS price $2.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
A METHOD FOR COMPUTING THE INTERACTION OF TWO SPHERICAL BLAST WAVES,
by R. C. Makino. Mar 63, 36p.
BRL MR1462

Unclassified report

Descriptors: *Shock waves, *Fluid flow, Compressible flow, Partial differential equations, Reflection, Impact shock, Viscosity.

The artificial viscosity method of von Neumann and Richtmyer for numerical solution of the partial differential equations of fluid flow is used to obtain a scheme for the numerical calculation of the interaction of two spherical blast waves in air.

AD-406 157 Div. 9
(TISTP/FEM) OTS price $7.60

Mississippi State U., State College.
THE STRUCTURE OF FREE AND CONFINED TURBULENT VORTICES,
by Joe Floyd Thompson, Jr. May 63, 1v. RN44
Contract Nonr978 03

Unclassified report

Descriptors: *Vortices, Turbulence, Velocity, Boundary layer, Pressure.

The turbulent entrainment analysis of the axisymmetric free turbulent jet developed by Faris is extended to describe the free turbulent vortex, and the resulting theory is compared with that of Newman and the experimental data of Gasparek and Dosanjh. The theory is then extended to describe the confined turbulent vortex and is compared with experimental measurements taken in a sink type vortex confined in a cylinder. (Author)

Division 9 - FLUID MECHANICS

AD-406 188 Div. 9, 25
(TISTP/RLG) OTS price $5.60

Naval Ordnance Lab., White Oak, Md.
THE STABILITY OF SELECTED BOUNDARY-LAYER PROFILES,
by John O. Powers, Gerhard Heiche, and S. F. Shen. Apr 63, 65p.
Task RGMA41 034
NOLTR 62 143; ARR 186 Unclassified report

Descriptors: *Boundary layer, *Boundary layer transitions, *Transport properties, Functions, Gases, Magnetic fields, Shear stresses, Reynolds number, Magnetohydrodynamics, Stability, Equations, Turbulent boundary layer.

An investigation of the stability characteristics of infinitesimal disturbances in selected laminar boundary-layer profiles was conducted. The results of the investigation give quantitative indications of the influence on boundary-layer stability of foreign gas injection, applied magnetic fields, and applied external shear. It is quantitatively shown that injected gases of large molecular weight and diameter may result in stabilization, whereas the light, small-diameter gases are generally destabilizing except for large values of the wall-to-free-stream temperature ratio. In addition, it is shown that a moderate external shear yields only percentage changes in the stability characteristics, whereas an applied magnetic field can produce order of magnitude changes in the stability. (Author)

AD-406 248 Div. 9, 12, 30
(TISTP/GRW) OTS price $21.00

Boeing Co., Seattle, Wash.
TURBULENT REFERENCE, ROUGHNESS, LEAKAGE AND DEFLECTED-SURFACE HEAT TRANSFER AND PRESSURE TESTS FOR TBC.
27 May 63, 1v. D2 80910
Contract AF33 657 7132
Unclassified report

Descriptors: *Aerodynamic configurations, *Shock tubes, Flat plate models, Cylindrical bodies, Leading edge flaps, Blunt bodies, Aerodynamic heating, Heat transfer, Pressure, Aerodynamic control surfaces, Surface temperature, Deflection, Tables, Model tests, Hypersonic flow.

Hypersonic tests of three basic models were conducted in the CAL 48-inch Hypersonic Shock Tunnel. The tests were run in the 23-inch and 46-inch exit-diameter contoured nozzles of the CAL Tunnel. The three models were: a blunt leading-edge model with sweep angles of 55, 60 and 65 degrees; a hemisphere-cylinder model; and a sharp flat plate with deflectable rear flap and span extensions. The objectives of the tests were as follows: (1) to obtain fully turbulent heat transfer rate and pressure data for leading edge, nose and flat surfaces with stream-to-wall property ratios characteristic of Dyna Soar flight conditions; (2) to establish the effect of transverse pressure gradient on roughness and leakage effects with laminar and turbulent boundary layer flow; (3) to define heat transfer, pressure distribution and region of separation for aerodynamic control surfaces; and (4) to determine the variation in pressure and heat transfer rate distributions with model attitudes. (Author)

AD-406 269 Div. 9, 25
(TISTP/RLG) OTS price $5.60

AVCO Everett Research Lab., Everett, Mass.
STAGNATION POINT HEAT TRANSFER MEASUREMENTS IN PARTIALLY IONIZED AIR,
by P. H. Rose and J. O. Stankevics. Apr 63, 49p.
RR143
Contract AF04 694 33
BSD TDR62 348 Unclassified report

Descriptors: *Heat transfer, *Gas ionization, *Shock tubes, *Stagnation point, Thermal radiation, Calorimeters, Boundary layer, Errors, Nitrogen, Data, Transport properties, Enthalpy, Statistical analysis, Measurement, Shock tubes, Thermal conductivity.

Experimental measurements of convective stagnation point heat transfer in partially ionized air at stimulated flight velocities up to 55,000 fps are presented. Stagnation point heat transfer rates were measured in an arc-driven shock tube with calorimetric heat transfer gages, either coated with silicon-monoxide films or uncoated. The data are compared to theoretical predictions made with a simple binary diffusion model of partially ionized diatomic gas, nitrogen, whose transport properties were estimated from measured and calculated cross-section data. Stagnation point heat transfer rates calculated from this model for both a frozen and an equilibrium boundary layer, as well as equilibrium boundary layer results from other available calculations using more elaborate models of air, are compared to the data. It is concluded that the transport properties of air up to 15,000 K are known to reasonable accuracy and that heat conduction by electrons does not present a serious engineering problem for flight velocities up to 50,000 fps. (Author)

AD-406 293 Div. 9, 25
(TISTP/WH) OTS price $3.60

Drexel Inst. of Tech., Philadelphia, Pa.
A PARAMETRIC STUDY OF THE HYPERVELOCITY PERFORATION OF VISCO-PLASTIC PLATES,
by Pei Chi Chou, Richard W. Mortimer, and Richard E. Llorens. Jan 63, 29p. DIT125 3
Contract DA36 034ORD3672
Unclassified report

Descriptors: *Hypervelocity projectiles, *Sheets, Viscosity, Plasticity, Penetration, Deformation.

Theoretical results based on a viscoplastic flow model for hypervelocity perforation of thin plates are presented. The solutions of the governing equations including the yield strength are obtained. The results of a parametric study performed on an IBM 1620 computer are also included. The effects on the radius of perforation due to various physical quantities are discussed. The theoretical radius of perforation and residual velocity are compared with the experimental values obtained by R. W. Watson. (Author)

AD-406 333 Div. 9, 31
(TISTP/WH) OTS price $3.60

David Taylor Model Basin, Washington, D. C.
THE MOTIONS OF A SPAR BUOY IN REGULAR WAVES,
by J. N. Newman. May 63, 30p. 1499
Unclassified report

Descriptors: *Spar buoys, *Water waves, Oscillations, Hydrodynamics, Mathematical analysis, Differential equations, Integration, Damping, Buoyancy, Motion, Bodies of revolution.

A linearized theory is developed for the motions of a slender body of revolution, with vertical axis, which is floating in the presence of regular waves. Equations of motion are derived which are undamped to first order in the body diameter, but second-order damping forces are derived to provide solutions valid at all frequencies including resonance. Calculations made for a particular circular cylinder show extremely stable motions except for the low frequency range where very sharp maxima occur at resonance. (Author)

AD-406 432 Div. 9, 25
(TISTP/JW) OTS price $10.10

University of Southern Calif., Engineering Center, Los Angeles.
RESEARCH ON RAREFIED GASDYNAMICS AND PLASMADYNAMICS,
by Raymond L. Chuan. Sep 62, 118p. 83 101
Contract AF49 638 831
AFOSR 4641 Unclassified report

Descriptors: *Gas analysis, *Plasma physics, Magnetohydrodynamics, Cryogenics, Wind tunnels, Fluid flow, Reynolds number, Dynamics, Ionization.

Research activities in the field of rarefied gasdynamics during the period September 1960 to August 1962 are reported in summary. Most of these constitute continuation of work reported previously, particularly in the experimental studies of rarefied gasdynamics and the attendant development of equipment experimental tools. New activities have been mainly in the general area of plasmadynamics which is distinguished from magnetohydrodynamics in that the gas in question is only partially ionized and the electrical conductivity is far from approaching infinity. This represents a direction towards treating realistic problems, some of which are of engineering interest, such as the re-entry radio communication problem. (Author)

AD-406 433 Div. 9, 25
(TISTP/WH) OTS price $7.60

Instituto Technologico De Aeronautica, Sao Paulo, Brazil.
SUPERSONIC FLOW ABOUT AXIALLY SYMMETRICAL DIFFUSERS,
by Jerzy Sielawa. 20 Nov 62, 68p.
Contract AF49 638 581
AFOSR 4729
Unclassified report

Descriptors: *Supersonic flow, *Diffusers, *Fluid mechanics, *Partial differential equations, Axially symmetric flow.

This report describes applications of the method of characteristics to supersonic flow about axially symmetrical, open-nosed bodies, such as diffusers. A general procedure is given for the computation of velocity distributions on the external surface of axially symmetrical diffusers of arbitrary shape. The case of straight-line diffusers is developed in more detail, including the case with incidence. A special function is introduced which allows a quick analytical solution of the problem of straight-line diffusers. (Author)

AD-406 459 Div. 9, 25, 15
(TISTP/WH) OTS price $3.60

Space Technology Labs. Inc., Redondo Beach, Calif.
INVISCID HYPERSONIC FLOW FOR POWER-LAW SHOCK WAVES,
James T. Lee, Jr. 16 Apr 63, 25p. 9813 6003
KU000
Unclassified report

Descriptors: *Hypersonic flow, Boundary layer, Axially symmetric flow, Entropy, Blunt bodies, Numerical methods and procedures, Series, Shock waves.

The blast wave solutions for the axisymmetric flow fields associated with a family of power-law shocks, y sub s equals approximately x to the n power, were modified to properly account for the entropy layer near the surface of the body. The method of inner and outer expansions was used. It was shown that this method is of limited usefulness for n only slightly greater than 1/2 due to the slow convergence of the inner expansions, but for (gamma + 2)/(3 gamma + 2) less than or equal to n <1 the expansions converge rapidly enough for the method to be useful. The case n = 1/2 is singular and causes no difficulty. In the range (gamma + 1) /(2 gamma + 1) less than or equal to n<1 the body shape given by blast wave theory is correct, but the blast wave flow field profiles must be modified near the body. (Author)

AD-406 468 Div. 9, 25
(TISTP/RLG) OTS price $3.60

Vidya Inc., Palo Alto, Calif.
ON THE USE OF IMPACT THEORY FOR SLENDER CONFIGURATIONS EXHIBITING FLOW SEPARATION,
by Alvin H. Sacks and Jack A. Burnell. 31 Mar 63, 31p. R92
Contract Nonr310300, Proj. 26 C
Unclassified report

Descriptors: *Impact shock, *Supersonic flow, *Aerodynamic configurations, Incompressible flow, Drag, Delta wings, Angle of attack, Mathematical analysis, Statistical analysis, Differential equations, Supersonic wind tunnels, Analysis, Theory, Separation, Slender bodies.

A method is presented for predicting analytically the non-linear variation of normal force with angle of attack for very slender wing-body combinations exhibiting flow separation. The method is based on the cross-flow drag concept and employs Newtonian impact theory in two dimensions to calculate the cross-flow drag coefficient. It is demonstrated that this theory shows good agreement with experiment for two-dimensional incompressible flow past bluff shapes. Furthermore, the analytical expression for the flat plate agrees exactly with the theoretical analysis of Bollay. Mathematical expressions are developed for the normal force on a conical slender wing-body combination with elliptical body of arbitrary eccentricity. Calculations are compared with experimental normal forces on wing-body combinations at supersonic speeds and on delta wings at subsonic speeds. The agreement appears to be very good over a wide range of angle of attack, provided that the slenderness approximation is satisfied and that separation occurs near the lateral extremities of the configuration in question. (Author)

AD-406 702 Div. 9
(TISTE/OHD) OTS price $4.60

Princeton U., N. J.
AN EXPERIMENTAL INVESTIGATION OF THE SEPARATION OF A HYPERSONIC BOUNDARY LAYER OF A FLAT PLATE -

Division 10 - FUELS AND COMBUSTION

PART I: PRESSURE DISTRIBUTION AND OPTICAL STUDIES AT M = 11.7,
by W. J. Graham and I. E. Vas. May 63, 41p.
Contract AF33 616 7629, Proj. 7064, Task 7064 01
ARL 63 74 Unclassified report

Descriptors: *Hypersonic flow, *Boundary layer, Hypersonic wind tunnels, Helium, Reynolds number, Schlieren photography, Flate plate models, Separation.

A study was carried out in the Princeton University 3-in. helium hypersonic wind tunnel at a Mach of 11.7 to examine the flow over a flat plate with disturbance located at a distance from the leading edge. The leading edge Reynolds number was varied from 190 to 20,900. The disturbances, varying in shape from a 10- to a 30- deg. wedge, a 90- deg. step and one with a hemicylindrical shape, were investigated over the leading edge Reynolds number range. Schlieren photographs and detailed surface pressure distributions were obtained to determine the location of the separation point and the pressure ratio across the separation region. (Author)

AD-406 705 Div. 9, 1
(TISTA/PCR) OTS price $11.50

Vidya, Inc., Palo Alto, Calif.
A THEORY FOR THE LOW-SPEED AERODYNAMICS OF STRAIGHT AND SWEPT WINGS WITH FLOW SEPARATION,
by Alvin H. Sacks, Jack N. Nielsen, and Frederick K. Goodwin. 31 Mar 63, 1v. VR91
Contract Nonr310300, Proj. 26C
Unclassified report

Supersedes Vidya Report No. 38, AD-251 431.

Descriptors: *Wings, *Swept-back wings, *Delta wings, Aerodynamic characteristics, Mathematical analysis, Theory, Aspect ratio, Vortices, Boundary value problems, Velocity, Mathematical models, Aerodynamic loading, Numerical analysis, Harmonic analysis, Wake, Fourier analysis, Load distribution, Angle of attack, Equations, Separations, Boundary layer, Subsonic flow, Subsonic characteristics.

A mathematical theory is developed for the low-speed aerodynamics of rectangular wings with side-edge separation. This theory is then extended to wings with sweptback leading edges (and straight trailing edges) by representing the actual wing as a system of elementary rectangular wings of varying aspect ratio. Thus, in the limit, steady separation along the entire leading edge is approximated, and the theory leads to an iterative computational procedure for calculating the aerodynamic characteristics of sweptback wings with leading-edge separation. Calculations are presented which demonstrate convergence of the method for both rectangular and delta wings, both with and without iteration on the shedding angles of the separated vortices. Comparisons with experiment are also presented for aspect ratios up to five, and it is found that for rectangular wings the calculated normal forces using one wing element are in all cases within 10% of experiment but the calculated shedding angles are unrealistically high. For delta wings, the high shedding angles evidently cause high predicted normal forces. (Author)

AD-406 756 Div. 9, 25
(TISTP/RLG) OTS price $3.60

St. Anthony Falls Hydraulic Lab., U. of Minn., Minneapolis.
AN ACOUSTIC STUDY OF GASEOUS MICRO-BUBBLES IN BOUNDARY LAYERS AND PROPELLER WAKES.
Rept. for Jan-Dec 62,
by John F. Ripken and John M. Killen. Dec 62, 31p. PR67
Contract Nonr71046
Unclassified report

Descriptors: *Acoustics, *Bubbles, *Wake, *Model basins, *Attenuation, Shear stresses, Pressure, Viscosity, Cavitation noise, Acoustic ranges, Acoustic equipment, Oxygen, Transducers (Acoustic), Cavitation, Propellers (Marine), Boundary layer, Analysis, Gases, Tests, Measurement.

Exploratory tests to measure the nature of the free gas which occurs in natural water due to the dynamic disturbance of a ship were conducted. Acoustic attenuation measurements serve to show that micro gas bubbles are evolved from dissolved gases by the shear dynamics of a boundary layer and that the rate of evolution increases as some function of the intensity and duration of the disturbance and of the pressure, viscosity, and gas content of the water. The tests were conducted in the Laboratory, in large scale simulations of a ship's boundary layer and propeller, and in wakes of actual ship propellers. These exploratory tests indicate the need for more extensive tests in sea water under a wide variety of naval operating conditions. Such tests are necessary to a better determination of the role that these bubbles play in cavitation and acoustic detection problems. (Author)

10. FUELS AND COMBUSTION

AD-405 958 Div. 10, 20
(TISTM/REB) OTS price $2.60

Defense Documentation Center, Cameron Station, Alexandria, Va.
CHEMICAL AND NUCLEAR PROPELLANT MATERIALS.
June 63, 17p.
Unclassified report

Descriptors: *Bibliographies, *Rocket propellants, *Nuclear propulsion, Materials.

AD-406 338 Div. 10
(TISTM/PCR) OTS price $11.00

Lockheed Propulsion Co., Redlands, Calif.
THERMAL STRESS INVESTIGATION OF SOLID PROPELLANT GRAINS. VOLUME I. THEORY AND EXPERIMENT,
by J. Jones, J. E. Fitzgerald, and E. Francis.
May 63, 1v. 578F, Vol. 1
Contract AF04 611 8013
Unclassified report

Descriptors: *Solid rocket propellants, *Thermal stresses, Theory, Experimental data, Fourier analysis, Thermal conductivity, Thermal Diffusion, Thermal expansion, Specific heat, Heat transfer, Temperature, Viscoelasticity, Mathematical analysis, Elasticity, Photoelasticity, Failure (Mechanics), Geometry, Creep, Propellant grains.

This volume presents the formulation, theoretical solution, mathematical analysis, and experimental confirmation of the problem of stress analysis for a real viscoelastic, case-bonded solid propellant grain subjected to an arbitrarily time-varying thermal input. A theoretical treatment of dynamic birefringence (photoviscoelasticity) is given in an appendix. (Author)

AD-406 339 Div. 10
(TISTM/PCR) OTS price $12.50

Lockheed Propulsion Co., Redlands, Calif.
THERMAL STRESS INVESTIGATION OF SOLID PROPELLANT GRAINS. VOLUME 2 - MATHEMATICAL ANALYSIS,
by K. C. Valanis and George Lianis. Dec 62, 169p. 578F, vol. 2
Contract AF04 611 8013

Unclassified report

Report on Studies in Stress Analysis of Visco-Elastic Solids Under Non-steady Temperature Gravitational And Inertial Loads.

Descriptors: *Solid rocket propellants, *Thermal stresses, Viscoelasticity, Temperature, Gravity, Cylindrical bodies, Stresses, Dynamics, Spheres, Numerical analysis, Integral equations, Deformation, Solids, Acceleration, Fourier analysis, Integral transforms, Digital computers, Equations, Errors, Propellant grains, Mathematical analysis.

The object of the present work is the investigation into the problems of stress and deformation of linear viscoelastic solids under various environmental conditions, such as gravity, temperature and inertia forces. In the first chapter, the thermal stresses in viscoelastic solids with temperature dependent properties are investigated, temperature dependence being limited to the thermorheologically simple type. The second chapter is occupied with the evaluation of the effects of the acceleration terms on the stress distribution in incompressible viscoelastic solids, again under conditions of non-uniform transient temperature. The third chapter is devoted to gravitational effects. In appendix I the problem of an infinite slab and a solid sphere are solved numerically for the purpose of illustration and compared with exact solutions. In Appendix II error estimates connected with one of the analytic methods are derived. In Appendix II the convergence of the first analytic method is established. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

No Entries

12. GUIDED MISSILES

AD-405 900 Div. 12
(TISTA/GEC) OTS price $5.60

Aerospace Corp., Los Angeles, Calif.
FEASIBILITY STUDY OF THE CONTROL OF THE MERCURY/ATLAS BOOSTER RE-ENTRY FROM ORBITAL MISSIONS,
by D. Pace and T. Shiokari. 15 May 63, 54p.
TDR169 3101TN1
Contract AF04 695 169

Unclassified report

Descriptors: *Launch vehicles (Aerospace), *Spacecraft debris, Feasibility studies, Fragmentation, Orbital trajectories, Analysis, Aviation safety, Hazards, Recovery, Population, Urban areas, Descent trajectories.

An investigation was undertaken into the feasibility of deorbiting the Mercury/Atlas booster in such a way as to prevent fragments of the booster from falling on land masses and to do this without compromising Mercury mission objectives. This report summarizes the various methods explored and presents the conclusions thereof. (Author)

AD-405 933 Div. 12, 13
(TISTE/JBM) OTS price $4.60

Boeing Co., Seattle, Wash.
SITE ACCEPTANCE TEST PROCEDURES WHITEMAN AFB.
20 May 63, 48p.
Contract AF04 694 107

Unclassified report

Descriptors: *Guided missiles (Surface to surface), *Launching sites, *Guided missile components, Test methods, Test equipment, Ground support equipment, Safety, Checkout procedures.

The acceptance tests required are specified for the checkout of equipment assembled into a Minuteman Missile System at Whiteman AFB preparatory to the eventual acceptance of the Flights, Squadrons & the entire Wing. Procedure documents required for the certification of Assembly and Checkout (ACO) test equipment as well as the documents required for checkout of OGE and MGE equipment are called out herein. (Author)

AD-405 955 Div. 12, 1
(TISTA/GEC) OTS price $2.60

Defense Documentation Center, Cameron Station, Alexandria, Va.
FLIGHT DYNAMICS.
June 63, 16p.

Unclassified report

Descriptors: *Aeronaautics, Dynamics, Space flight, Flight, Satellites (Artificial), Bibliographies.

AD-405 971 Div. 12
(TISTE/JBM) OTS price $13.50

Boeing Co., Seattle, Wash.
COMPATIBILITY INDEX - END ITEM. H & D WEAPON SYSTEM, MINUTEMAN.
1963, 1v. D2 14191
Contract AF04 647 289

Unclassified report

Descriptors: *Guided missiles (Surface-to-surface), Compatibility, Guided missile components, Configuration, Indexes.

A compatibility index is presented for the MINUTEMAN weapon system. The purpose of the compatibility index is as follows: Provide lists of compatible configurations of H & D Weapon System end items. As such it will support end item allocation by the MINUTEMAN Production Board. Provide a working tool between AFBSD Exhibit 60-60, MINUTEMAN Weapon System Operational Configuration Index, and AFBM 60-59, WS-133A Master Equipment Schedules and Allocation Document. Provide a ready index of interchangeable end items of equipment. (Author)

Division 12 - GUIDED MISSILES

AD-405 980 Div. 12
(TISTP/WH) OTS price $4.60

Boeing Co., Seattle, Wash.
LAUNCH CONTROL SYSTEM TEST PROCEDURES, NETWORK RESOLUTION AREA (NRA),
by D. M. Viehouser. 27 Sep 62, 43p. D2 13406 V2
Contract AF04 647 289
Unclassified report

Descriptors: *Launching, *Control systems, Test methods, Tests.

AD-406 076 Div. 12
(TISTP/WH) OTS price $8.60

Boeing Co., Seattle, Wash.
STATISTICAL MEANS AND DISPERSIONS FOR THE MASS PROPERTIES OF BOEING COMPONENTS FOR THE WING II OPERATIONAL MINUTEMAN MISSILE, JUNE 1, 1963,
by Roger C. Wierenga. 20 May 63, 87p. D2 13956 2
Contract AF04 694 46
Unclassified report

Descriptors: *Weight, *Guided missile components, Tables, Statistical analysis, Statistical data.

This report presents statistical means and dispersions for the mass properties of the Boeing components of the Operational Minuteman missile. The data are based upon a statistical analysis of the hardware being produced for the Wing II Operational missiles. (Author)

AD-406 086 Div. 12, 27, 31
(TISTP/RLG) OTS price $8.10

Naval Weapons Lab., Dahlgren, Va.
TERRIER STRUCTURAL FIRING TEST ABOARD THE USS LEAHY (DLG-16),
by J. W. Loving, T. I. Dodson, P. E. Wine and J. A. Lamonica. 9 May 63, 1v.
NWL 1857
Unclassified report

Descriptors: *Guided missiles (Surface-to-air), *Booster rockets, *Structural parts, Guided missile safety, Measurement, Guided missile launchers, Instrumentation, Deflection, Stresses, Gas leaks, Temperature, Pressure, Flames, Noise, Smokes, Tests, Ventilation ducts, Penetration, Seals (Stoppers), Flight testing, Blast, Damage.

Ten TERRIER Mk 12 Mod 0 boosters with concrete slugs were fired aboard the USS LEAHY (DLG-16) to investigate the adequacy of protection for the TERRIER launching system personnel against blast effects and to determine the effects of the booster blast on the ship's structure. The test vehicles were fired at various angles such that the exhaust stream was directed at areas thought to impose the most severe conditions on the ship's structural components and equipment. Measurements were made of structural deflections and strains, sound pressure levels, toxic gas concentrations, pressures, flame penetrations at door and port seals, and temperature changes on equipment and in areas manned during missile firings. High-speed motion pictures were taken on all tests. The results of the tests indicated leakage of gas and smoke into the ship through ventilation systems and past seals of various doors and ports, high temperature changes at the openings of the air escape vents for the JP-5 and the fuel oil tanks; and minor structural damage to equipment in the launcher areas. (Author)

AD-406 124 Div. 12, 9, 8
(TISTE/JWS) OTS price $4.60

Varian Associates, Palo Alto, Calif.
FOUR-CELL ROCKETBORNE MAGNETOMETER.
Final rept.,
by Robert E. Morris. Jan 63, 41p.
Contract AF29 601 5120, Proj. 7811, Task 781106
AFSWC TDR62 101 Unclassified report

Descriptors: *Magnetometers, *Rocket research, Rubidium, Vapors, Transistors, Power supplies, Photoelectric cells (Semiconductor), Radiofrequency oscillators, Transistor amplifiers, Telemeter systems, Data processing systems, Telemetering data, Magnet coils, Magnetic fields.

The theory, design, installation, and successful operation of a four-gas-cell, wide-range, nearly omnidirectional rubidium-vapor magnetometer system intended for rocketborne use are described. Included is a detailed description of two coil systems and their power supplies and housing, comprising a magnetic test facility designed, fabricated, and installed at the Special Weapons Center. Each magnetometer will operate continuously in ambient magnetic fields ranging in intensity from approximately 100 gammas to more than 1 oersted (ten to the fifth power gammas). Since Rb85 is employed in the gas cells, the Larmor frequency can vary from nearly zero to approximately 500 kc/s in this field range; a signal processor developed for this magnetometer maps any signal within this band into an output signal varying in frequency between a few hundred cycles per second and 100 kc/s. (Author)

AD-406 135 Div. 12
(TISTP/JEA) OTS price $11.00

Boeing Co., Seattle, Wash.
LAUNCH CONTROL SYSTEM TEST PROCEDURES, NETWORK RESOLUTION AREA (NRA),
by D. M. Viehouser. 4 Oct 62, 149p.
D2 13406, V3
Contract AF04 647 289
Unclassified report

Descriptors: *Guided missiles (Surface to surface), *Guided missile launchers, *Control systems, *Power supplies, *Redundant components, Communication equipment, Lighting equipment, Telephone equipment, Computer, Controlled sequences, Checkout procedures, Test methods, Ground support equipment, Networks.

AD-406 148 Div. 12, 18, 31
(TISTE/CAM) OTS price $6.60

George Washington U., Washington D. C.
THE POLARIS MILITARY ESSENTIALITY SYSTEM,
by Marvin Denicoff, Joseph Fennell, Sheldon E. Haber, W. H. Marlow, and Frank W. Segel.
10 Jan 63, 59p. ST148, Rev.; Polaris Logistics Studies no. 1.
Contract Nonr761, Projs. NR345 107 and NR047 001, Tasks 03 and 05
Unclassified report

Descriptors: *Guided missiles (Underwater to surface), *Guided missile components, Military requirements, Coding, Public opinion, Data processing systems, Programming (Computers), Reliability, Effectiveness, Measurement, Degradation, Naval equipment, Material control, Operations research, Scheduling, Queueing theory, Probability, Ballistic missile submarines, Surface to surface, Logistics, Failure (Mechanics).

One of the major requirements in the development of military inventory systems has been the need for a measure of the relative importance of stocking one item rather than another. This need has been heightened in the first place by general difficulties of demand prediction and secondly by the continued introduction of new and relatively untried elements of weapons systems. A third contributing factor is the feature common to all inventory problems that allocations must be made in the face of constraints of one form or other. The present study develops a military essentiality system which has been implemented in response to the above needs for fleet ballistic missile submarines. After a careful development of the background and general requirements for the system, a very nearly axiomatic approach is taken in order to derive fundamental principles and basic techniques to permit distinguishing relative degrees of military worth. This makes it possible to determine classes of equivalent essentiality. (Author)

AD-406 149 Div. 12, 18, 31
(TISTE/JBM) OTS price $8.60

George Washington U., Washington, D. C.
POLARIS ALLOWANCE LIST INPUT DATA,
by Marvin Denicoff, Joseph Fennell, W. H. Marlow, and Henry Solomon. 18 Jan 63, 83p.
S T154; PLS2
Contract Nonr761, Proj. NR345 107; NR047 001, Task 03; 05
Unclassified report

Descriptors: *Guided missiles (Underwater to surface), *Guided missiles (Surface to surface), *Ballistic missile submarines, Nuclear powered vessels, Armed forces supplies, Naval research, Data, Logistics.

A description is presented of data which are presently available for fleet ballistic missile submarine allowance-list determinations, and which can be used in evaluating various proposed allowance-list methodologies. Various properties are developed for allowance list candidates and standard terminology is adopted accompanied by appropriate notation. There is also included a precise description of the format for a published 'Optimum COSAL' allowance list. The paper concludes with summaries of certain data for the case of USS GEORGE WASHINGTON (SSB(N) 598). (Author)

AD-406 159 Div. 12, 26
(TISTP/JW) OTS price $8.60

Boeing Co., Seattle, Wash.
WS-133. STATISTICAL MEANS AND DISPERSION FOR THE MASS PROPERTIES OF BOEING COMPONENTS FOR THE WING I OPERATIONAL MINUTEMAN MISSILE -- JUNE 1, 1963,
by Roger C. Wierenga. 20 May 63, 98p. D2 13957 5
Contract AF04 694 46
Unclassified report

Descriptors: *Guided missiles (Surface to surface), Statistical analysis, Aerodynamic characteristics, Guided missile components, Tests, Weight, Tables.

AD-406 166 Div. 12, 22
(TISTP/WH) OTS price $11.50

Texas U., Austin.
SCORING METHODS STUDY.
Final rept.
Mar 63, 148p.
Contract AF08 635 2631, AFSC Proj. 7844
ASD TDR63 17 V1 Unclassified report

Descriptors: *Firing-error indicators, *Trajectories, *Guided missiles, Antimissile defense systems, Electrostatics, Magnetic fields, Nuclear radiation spectrometers, Gravity, Inertial guidance, Pressure, Electromagnetic waves, Equations, Motion, Aerial targets, Measurement.

The results of a study of the applicability of seven classes of physical phenomena to trajectory scoring - measuring the relative trajectory of a munition with respect to its target - are presented. The seven phenomena (classes) considered are: (1) electrostatic fields; (2) magnetic fields; (3) nuclear radiation; (4) gravitational fields; (5) inertial systems; (6) pressure waves; and (7) electromagnetic (optical) radiation. In addition, several mathematical studies which treat the encounter geometry, the relationship of measurement accuracy to position errors, data-handling problems, and the influence of own-ship angular motion on the accuracy of position determination are presented. Included also is an extensive bibliography. Scoring-system recommendations are made for the three general target classes: satellites, intercontinental ballistic missiles and aerodynamic-type vehicles. (Author)

AD-406 228 Div. 12
(TISTA/GEC) OTS price $11.00

Boeing Co., Seattle, Wash.
ENGINEERING DEVELOPMENT LABORATORY (EDL) TEST REPORTS, LAUNCH AND COMMUNICATIONS CONTROL CONSOLE,
by D. Gladish. 5 Feb 63, 1v. T2 2564, V3
Contract AF04 647 289
Unclassified report

Descriptors: *Guided missiles (Surface to surface), Communications systems, Command and control systems, Military requirements, Tests, Maintainability, Acceptability, Ground support equipment.

The test reports presented correspond to the test requirements specified in D2-5684, Vol. 3, for the EDL/PT of the Launch and Communications Control Consoles. The test requirements included tests to show specification compliance, compatibility under marginal test conditions, and interface problems for the Launch and Communications Control Consoles of the WS-133A Weapon System. (Author)

AD-406 231 Div. 12, 26
(TISTP/GRW) OTS price $8.60

Boeing Co., Seattle, Wash.
WS-133A MAINTAINABILITY PROGRESS REPORT,
by Earl Hardy. 12 Apr 63, 95p. D2 14934 4
Contract AF04 648 289
Unclassified report

Descriptors: *Guided missile (Surface to surface), Logistics, Operations resear, Tables, Maintenance.

AD-406 236 Div. 12, 17
(TISTA/LSK) OTS price $5.60

Boeing Co., Seattle, Wash.
CRYOGENIC TANKS DEVELOPMENT. (DYNA SOAR),
by D. L. Matterand. 31 May 63, 1v. D2 80092
Contract AF33 657 7132
Unclassified report

Descriptors: *Cryogenic storage devices, Cryogenics, Liquefied gas, Hydrogen, Aluminum alloys, Hydrostatic pressure, Rupture, Nitrogen, Fuel tanks, Boost-glide vehicles, Stresses, Mechanical properties.

Two test programs were conducted to obtain basic structural data on the use of 2219-T6E46 aluminum for the X-20 cryogenic storage tanks. The following summarizes the test results: (1) Biaxial strength of 2219-T6E46 aluminum at temperatures of -395 F. and lower at 91,000 psi (min.) compared to uniaxial strengths of 88,200 psi (min.) at -423 F. (2) Ductile failures occurred in all four test tanks at temperatures of -320 F and -395 F. (3) A low factor, prototype liquid nitrogen tank failed at a pressure of 2650 psi after 252 pressure cycles at 1000 ± 50 psi. (Author)

AD-406 292 Div. 12
(TISTE/CRJ) OTS price $12.00

Boeing Co., Seattle, Wash.
FLIGHT ARTICLE MASS PROPERTIES REPORT FOR MINUTEMAN WING II COMPONENTS FOR MISSILE 688-738, by Charles A. Hanson. 20 May 63, 1v. D2 13946 5
Contract AF04 694 46
Unclassified report

Descriptors: *Guided missiles (Surface-to-surface), Load distribution, Gravity, Weight.

Mass property summaries of the Boeing components for a series of Operational Wing II Minuteman missiles are presented. The serialized components included in the data for each missile are those committed to that particular missile during the course of production and may not be the ones finally installed during assembly. (Author)

AD-406 349 Div. 12, 26, 32
(TISTA/PCR) OTS price $3.60

Boeing Co., Seattle, Wash.
WEAPON SYSTEM REQUIREMENTS AND DESCRIPTION, S-133-10. VOLUME 1A INTRODUCTION; TABLE OF CONTENTS; USAGE INDEX.
16 Feb 63, 1v. D2 30044 1A
Contract AF04 694 266
Unclassified report

Descriptors: *Guided missiles (Surface-to-surface), Indexes, Strategic weapons, Personnel, Research program administration, Maintenance, Weapon systems, Launching sites, Reports, Air Force operations, Documentation.

The Weapon System Requirements and Description document series presents a detailed functional description of the WS-133B Weapon System. Its purpose is to identify the equipment, personnel, facilities and data that are necessary components of the weapon system. This document series contains the forms, diagrams and drawings developed and approved during the analysis, thus providing source data for all agencies concerned with the development of equipment elements, facilities criteria, personnel and training requirements, technical manual data, provisioning data and logistics planning. (Author)

AD-406 464 Div. 12, 26
(TISTA/GEC) OTS price $21.00

Boeing Co., Seattle, Wash.
MINUTEMAN WS-133B. REQUIREMENTS AND DESCRIPTION. WING VI. VOLUME 3A. FIGURE A's. OPERATIONAL AVE, OGE, RPIE.
16 Feb 63, 1v. D2 30044 3A
Contract AF04 694 266
Unclassified report

Report on Weapon System Requirements and Description, S-133-10.

Descriptors: *Guided missiles (Surface-to-surface), Ground support equipment, Launch sites, Accelerometers, Power supplies, Guided missile batteries, Coding, Thrust vector control systems, Electric cables, Inertial guidance, Collimators, Cooling, Guided missile launchers, Storage batteries, Catalogs, Tables, Military requirements.

This Weapon System Requirements and Description Document presents a detailed functional description of the WS-133B Weapon System. The operational equipment data forms developed during the system requirements analysis are presented on aerospace vehicle equipment, operational ground equipment, and real property installed equipment. (Author)

AD-406 482 Div. 12, 30
(TISTP/AW) OTS price $9.60

Minneapolis-Honeywell Regulator Co., Minn.
STABILITY AND CONTROL STUDY FOR A MANNED ORBITAL RESEARCH LABORATORY.
Progress rept.
11 Apr 63, 1v. 2A S44 2
Unclassified report

Descriptors: *Space stations, *Stabilization systems, Control, Manned spacecraft, Laboratories, Torque, Spin, Fuel consumption, Human engineering, Motion, Thrust vector control systems, Control jets, Configuration, Models (Simulations), Gravity, Solar panels, Stabilization.

Results of previous studies were that gravity gradient torques were the most significant source of disturbance and would require 5000 pounds of reaction jet fuel per year, in order to maintain the vehicle spin axis oriented toward the sun. The control equations developed allowed reaction jets to provide orientation control, control moment gyros or reaction wheels to control vehicle damping and balance torques introduced by vehicle mass imbalance. ON-OFF operation of reaction jets was found adequate for station control and provided optimum ultization of fuel. Analysis of vehicle structural flexibility did not indicate any stability problems for the configurations considered. A breadboard mechanization of the stabilization and control system was developed and checked out on an air bearing table. Studies of smaller spinning and nonspinning concepts have continued. Some of the system characteristics and design parameter relationships are reviewed. A set of four characteristic configurations have been analyzed and a design approach to each of the configurations for various values of inertias is presented. A 90-day resupply cycle has been assumed in this study.

AD-406 691 Div. 12, 13
(TISTA/AAR) OTS price $2.50

Reaction Motors Div., Thiokol Chemical Corp., Denville, N. J.
DETECTION OF HYDROGEN-AIR FIRES AND EXPLOSIONS IN AEROSPACE VEHICLES VIA OH BAND AND WATER BAND EMISSION.
Final rept., 1 June-1 Nov 62,
by K. Hill and B. Hornstein. Apr 63, 96p.
RMD5508F
Contract AF33 657 8969, Proj. 6075, Task 607501
ASD TDR63 113 Unclassified report

Report on Characteristics of Propellant Flames for Detection.

Descriptors: *Explosions, Hydrogen, Fire alarm systems, Aerospace craft, Hydroxides, Measurement, Ultraviolet radiation, Temperature, Monitors, Pressure, Detection.

To provide a basis for reliable hydrogen-air fire and explosion detection in aerospace vehicles, measurements of the absolute value of radiant intensity were made over the OH bands of the ultraviolet and the water bands in the infrared. A surprising result was the increase in OH radiant intensity with decreasing pressure. Diffusion flame variables were hydrogen flow rate, port diameter, and pressure from 760 to less than 20 mm Hg. For explosions, mixture ratio as well as pressure were varied; the rate of increase of emission and pressure after ignition were measured to determine detection lead time. Where possible, results are presented as fundamental quantities which can be applied with reasonable rigor to a variety of design situations. Detection based upon monitoring OH radiation is recommended over other properties such as IR radiation, ionization, temperature rise, or pressure rise. Application of the data to specific designs is discussed. (Author)

AD-406 710 Div. 12, 26
(TISTE/OHD) OTS price $6.60

Boeing Co., Seattle, Wash.
FLIGHT ARTICLE MASS PROPERTIES REPORT FOR MINUTEMAN WING I COMPONENTS, MISSILES 708-858, by Fred W. Sladen. 20 May 63, 60p. D2 13944 708
Contract AF04 694 46
Unclassified report

Descriptors: *Guided missiles (Surface to surface), Experimental data, Guided missile components, Weight.

Mass property summaries of the Boeing components for a series of operational Wing I Minuteman missiles are presented. The serialized components included in the data for each missile are those committed to that particular missile during the course of production and may not be the ones finally installed during missile assembly at Air Force Plant 77. (Author)

AD-406 711 Div. 12, 26
(TISTE/OHD) OTS price $7.60

Boeing Co., Seattle, Wash.
FLIGHT ARTICLE MASS PROPERTIES REPORT FOR MINUTEMAN WING II COMPONENTS FOR MISSILES 653-687, by Fred W. Sladen. 22 Apr 63, 72p. D2 13946 4
Contract AF04 694 46
Unclassified report

Descriptors: *Guided missiles (Surface-to-surface), Experimental data, Guided missile components, Weight.

Mass property summaries of the Boeing components for a series of operational Wing II Minuteman missiles are presented. The serialized components included in the data for each missile are those committed to that particular missile during the course of production and may not be the ones finally installed during missile assembly at Air Force Plant 77. (Author)

AD-406 723 Div. 12
(TISTA/EJH) OTS price $9.10

Boeing Co., Seattle, Wash.
VAFB ACCEPTANCE/DEMONSTRATION PROGRAM PLAN, by J. C. Hindmarch and R. V. Smith. 12 June 63, 106p. D2 13302 3
Contract AF04 647 757
Unclassified report

Descriptors: *Guided missiles (Surface to surface), Standards, Instruction manuals, Handling, Ground support equipment, Quality control, Checkout procedures, Checkout equipment, Launching sites, Acceptability.

The purpose of this document is to define the tasks, data, and procedures required to accomplish the Assembly and Checkout (A&C/O), Modification and Checkout (M&C/O), Acceptance, and Delivery/Turnover activities for the Minuteman WS-133A Wing III through V Weapon System Facilities at Vandenberg Air Force Base (VAFB) (Author)

AD-406 768 Div. 12, 26
(TISTE/JWS) OTS price $1.60

Ogden Air Materiel Area, Hill Air Force Base, Utah.
SERVICE AND SHELF LIFE OF SEV 44B EXPLOSIVE VALVE - IM99A,
by Don F. Woods. May 63, 9p.
OOY TR 63 18 Unclassified report

Descriptors: *Valves, Guided missiles, Tests, Life expectancy, Reliability, Ammonia, Temperature, Test methods, Corrosion, Explosive actuators.

The SEV 44B explosive valve is used to control the flow of ammonia from the IM99A nose cooling unit storage tank to the heat exchanger. The purpose of this test was to determine if the shelf and service life could be extended. The current shelf life and service life of the SEV 44B valve are 3 years and 2 years, respectively. Because of this limitation, it was necessary to replace these valves when this time was reached or to determine if their service life could be extended. Twenty-nine samples were tested. These specimens were visually inspected, radiographed and temperature conditioned prior to testing. During testing, the valves were pressurized to 200 psig with nitrogen to simulate the pressure of the ammonia tank. All valves functioned satisfactorily. The minimum firing voltage (6.5 - 10 v) was well above specification maximum no fire voltage of 3 v. The minimum operating current (0.27 - 0.40 amps) was less than that called out by the specification (0.5 amp) but was within the calculated value. Demonstrated reliability was 90.2% at a confidence limit of 95%. The valves were between 3.5 years and 4 years old when functioned. It is recommended that the service life of the SEV 44B valve be extended to four years and the shelf life to five years. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-405 914 Div. 13
(TISTE/JWS) OTS price $2.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
COOPERATIVE MARINE PILING INVESTIGATION. PHASE I. PILE DRIVING AT COCO SOLO, CANAL ZONE, by Harry Hochman. 29 Apr 63, 23p.
NCEL TN473 Unclassified report

Descriptors: *Anchors (Structure), Piers, Creosote, Tar, Penetration, Arsenic compounds, Mercury compounds, Environmental tests.

Division 13 - INSTALLATIONS AND CONSTRUCTION

The Cooperative Marine Piling Committee and the Bureau of Yards and Docks exposed 54 specially treated piles at Coco Solo Annex, Rodman Naval Station, Canal Zone. The treatments being evaluated are chromated copper arsenate followed by creosote, ammoniated copper arsenate followed by creosote, and phenylmercuric oleate in creosote-coal tar solution. Unmodified 70/30 creosote-coal tar solution is being used as the comparison standard. This report describes the installation of these piles at the test site. (Author)

AD-406 153 Div. 13, 22
(TISTE/JWS) OTS price $3.60

Ammunition Group, Picatinny Arsenal, Dover, N. J.
ESTABLISHMENT OF DESIGN CRITERIA FOR PROTECTIVE STRUCTURES AND PROCESSING OF EXPLOSIVES,
by Richard M. Rindner and Leon W. Saffian.
Mar 63, 33p.
PA TM1144 Unclassified report

Descriptors: *Safety, *Structures, *Blast, Personnel, Projectiles, Spallation, Velocity, Concrete, Reinforced concrete, Explosive materials, Explosion effects.

The development of design criteria for protective structures to prevent propagation of explosives into the acceptor charge and personnel injury is discussed. The overall design approach was divided into three separate areas -- donor effects, wall response and acceptor effects. Since this presentation, certain revisions have been made to relationships used in the illustrative examples. However, these revisions do not alter the design principles discussed. (Author)

AD-406 162 Div. 13, 33
(TISTE/JBM) OTS price $8.10

Federal Aviation Agency, Atlantic City, N. J.
VEHICULAR MEASUREMENTS OF EFFECTIVE RUNWAY FRICTION,
Final rept.
by Jack J. Shrager. May 62, 1v.
Task 308 3X
Unclassified report

Descriptors: *Jet planes, *Airplane landings, *Runways, *Friction, Airports, Effectiveness, Vehicles, Surface properties, Instrumentation, Ice, Water, Concrete, Foams, Test methods, Test equipment, Brakes, Measurement.

Tests were conducted to determine the relationship of friction measurements, as computed from full-scale jet aircraft braking tests, to measurements obtained with special ground vehicular equipment on an operational runway under simulated adverse weather conditions. Results indicated that it may be possible to employ special vehicular equipment to obtain operational runway surface friction which can be related to the maximum energy braking effectiveness for a full-scale jet aircraft. (Author)

AD-406 165 Div. 13, 33, 1
(TISTP/TL) OTS price $10.10

Federal Aviation Agency, Washington, D. C.
RUNWAY SLUSH EFFECTS ON THE TAKEOFF OF A JET TRANSPORT.
Final rept.,
by Daniel E. Sommers, John F. Marcy, Eugene P. Klueg, and Don W. Conley. May 62, 1v.
Proj. 308 3X
Unclassified report

Descriptors: *Runways, *Transport planes, *Jet planes, *Airplane landings, Deceleration, Aviation safety, Measurement, Drag, Velocity, Aerodynamics characteristics, Instrumentation, Tests, Take-off, Landings, Hazards.

In recognition of reduced takeoff and braking performance of aircraft on slush-covered runways of limited length, operational tests were conducted on a commercial jet transport aircraft under a controlled slush environment. The test program consisted of two phases related to: (1) problems associated with takeoff; and (2) problems associated with braking. This final report is on Phase I. The more significant findings resulting from the test program on the Convair 880M were the following: (1) the magnitude of slush drag forces was considerably greater than that predicted by earlier tests and theoretical approaches; (2) aquaplaning of the aircraft at high velocities caused a significant reduction in slush drag; (3) slush spray impingement against the aircraft and landing wheels was a significant factor in producing additional slush drag to that caused by the tires; (4) considering wheel size, a proportionately larger slush drag force was produced by the nosewheels than that produced by the main wheels; (5) considerable slippage in slush was experienced by the nosewheels and forward main wheels with little slippage on the aft main wheels; and (6) considerable slush accumulated in recessed areas of the aircraft and presented a possible operational hazard. (Author)

AD-406 174 Div. 13, 25
(TISTE/OHD) OTS price $7.60

Little, Arthur D., Inc., Cambridge, Mass.
WATER AND CARBON DIOXIDE FREEZE-OUT IN HIGH PERFORMANCE HEAT EXCHANGERS,
by J. C. Burke, F. E. Ruccia, R. B. Hinckley, and R. C. Reid. 1963, 1v.
Unclassified report

Descriptors: *Heat exchangers, *Solidified gases, Carbon dioxide, Water vapor, Theory, Test methods, Air, Analysis, Cryogenics.

An analytical and experimental study was conducted to investigate the principal mechanisms of water and carbon dioxide freeze-out and to develop a method for predicting the effects of contaminant freeze-out on heat exchanger performance. This program has included an analytical study of the various mechanisms by which contaminant freeze-out may occur. A test facility was constructed having the capability of simulating a wide range of air stream pressures, temperatures, mass flow, and concentration conditions. A glass-walled test heat-transfer section allowed visual and photographic observations of the frost formation as well as measurements of its effects on heat transfer and pressure drop. Based on the analytical and experimental results, the importance of the various mechanisms of contaminant freeze-out was evaluated and a method generated for predicting the effect of contaminant freeze-out on heat exchanger performance. (Author)

AD-406 321 Div. 13, 20
(TISTE/CAM) OTS price $4.60

Engineer Corps., Washington, D. C.
ENGINEERING AND DESIGN, UTILIZATION OF NUCLEAR POWER PLANTS IN UNDERGROUND INSTALLATIONS,
15 Apr 63, 36p.
EC EM1110 345 950
Unclassified report

Descriptors: *Nuclear power plants, *Underground structures, Power plants, Power reactors, Feasibility studies, Operation, Exhaust fumes, Vibration, Noise, Vulnerability, Logistics, Site selection, Heat transfer, Air conditioning equipment, Design, Rock (Geology), Soils.

Information is presented on the utilization of nuclear power plants in underground installations and for guidance in the design of underground installations and it is applicable to all elements of the Corps of Engineers having this responsibility. The manual provides information on nuclear power to assist Corps of Engineers personnel in selecting the source of power for an underground installation that might be required to operate in a buttoned-up status, i.e., a completely closed and isolated situation over a period of days or weeks. The underground installation may be utilized for missile sites, command centers, communication centers, or storage facilities. (Author)

AD-406 634 Div. 13, 7
(TISTM/WA) OTS price $.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
DISTILLING SEA WATER WITH DIESEL GENERATOR WASTE HEAT.
Final rept.,
by J. S. Williams and W. R. Nehlsen. 23 May 63, 18p.
Proj. Y F015 11 611
NCEL R245

Unclassified report

Descriptors: *Sea water, *Distillation, Wastes (Industrial), Heat, Generators, Diesel engines, Mechanical engineering, Tests, Steam condensers, Evaporators.

NCEL investigated the amount of heat available from a 60-kw generator and tested a waste-heat still for operation in conjunction with the generator. Test results have shown that approximately 200 gph of distilled water can be produced by the waste-heat still and the combination of units is feasible. (Author)

AD-406 785 Div. 13, 25
(TISTE/JWS) OTS price $16.50

Massachusetts Inst. of Tech., Cambridge.
STATIC AND DYNAMIC BEHAVIOR OF REINFORCED CONCRETE CIRCULAR ARCHES. PART I,
by Vijay N. Gupchup. Mar 63, 237p. R63 5
Contract DA49 146XZ105
DASA 1358

Unclassified report

Descriptors: *Reinforced concrete, *Structural properties, Tests, Geometric forms, Loading (Mechanics), Load distribution, Compressive properties, Stresses, Statics, Dynamics, Structures.

The experimental and analytical studies indicate that the approximate conventional theory based on limit analysis is quite adequate to predict the static ultimate loads of the underreinforced arches. The dynamic ultimate loads for compression mode loading can also be predicated by approximate theory provided that an appropriate dynamic increase factor (based on the increase in material properties) is used. However, it is not clear whether a satisfactory approximate theory can be developed to predict the ultimate dynamic load carrying capacity of the arch, subjected to a concentrated dynamic load at the crown or antisymmetric concentrated dynamic loads at quarter points. The experimental and analytical investigations also indicate that the natural periods of the arches have a significant influence on the dynamic load-carrying capacity of the arches in the cases of a concentrated load at the crown and antisymmetric concentrated loads at quarter points. The mode of failure under both static and dynamic loads is quite ductile in these cases as compared to the compression mode loading. (Author)

14. MATERIALS (NON-METALLIC)

AD-405 959 Div. 14
(TISTM/AM) OTS price $8.60

Defense Documentation Center, Cameron Station, Alexandria, Va.
MATERIALS.
June 63, 91p.

Unclassified report

Descriptors: *Materials, *Bibliography, Heat resistant materials, Heat resistant metals and alloys, Heat resistant glass, Heat resistant plastics, Ceramic materials, Low temperature research, Lubricants, High temperature research, Refractory materials, Fire-resistant coatings, Paints, Ceramic coatings, Aluminum alloys, Steels, Mechanical properties, High pressure research, Fatigue (Mechanics), Processing, Sintering, Stresses, Creep, Hydrogen embrittlement, Tool steels, Stainless steel, Melting, Welding, Heat treatment, Corrosion inhibition, Coatings, Adhesives.

Contents:
Fire resistant-paint
Heat and fire resistant polymers and plastics
Heat resistant alloys
Heat resistant-materials, general
Heat resistant-glass
High temperature ceramics
High temperature lubricants
Low temperature research
Refractory materials

AD-406 117 Div. 14
(TISTP/FEM) OTS price $5.60

Massachusetts Inst. of Tech., Cambridge.
BEHAVIOR OF BOND UNEDER DYNAMIC LOADING,
by Indravadan K. Shah. Mar 63, 48p. DSR8699
Contract DA49 146XZ061
DASA 1374

Unclassified report

Descriptors: *Bonding, *Concrete, Bonded joints, Rods, Reinforced concrete, Tests, Stresses, Beams, Load distribution, Castings.

The bond behavior of reinforcing bars under dynamic loading, as influenced by the compressive strength of concrete and diameter of the reinforcing bars is reported. This research program is the continuation of previous research, conducted in the Structures Division of the Civil Engineering Department of M.I.T. in 1959. The present program has covered the following categories of tests: Specimens with variation in the compressive strength of concrete. In this category, three different concrete strengths 2000 psi, 3500 psi and 6000 psi are used. Specimens with the variation in the diameter of reinforcing bar. Three different bars #8, #10 and #14 are used. (Author)

Division 14 - MATERIALS (NON-METALLIC)

AD-406 120 Div. 14, 4
(TISTM/REB) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
HEAT CAPACITY OF CRYSTALLINE POLYMERS AT LOW TEMPERATURES,
by R. W. Warfield and M. C. Petree. 12 Mar 63, 6p.
NOL TR63 9 Unclassified report

Descriptors: *Polymers, *Polyethylene plastics, Calorimeters, Crystals, Low temperature research, Molecular structure, Thermochemistry.

Published heat capacity data on atactic and isotactic polypropylene, polyethylene and polytrifluoroethylene were analyzed by the method of Starkweather. The results of this analysis indicate that the model proposed by Stockmayer and Hecht for the thermal motions of crystalline polymers at low temperatures can yield information indicative of the structure of the polymer. (Author)

AD-406 127 Div. 14, 12, 26
(TISTE/JBM) OTS price $4.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
OPERATIONAL EVALUATION OF DRY-LUBRICANT COMPOSITES IN A HIGH VACUUM CHAMBER,
by A. G. Williams and T. L. Ridings. May 63, 40p.
Contract AF40 600 1000, Proj. SN2215
AEDC TDR63 67
Unclassified report

Descriptors: *Lubricants, *Low-pressure research, Bearings, Gears, Halocarbon plastics, Tungsten compounds, Selenides, Tests, Test facilities, Test equipment, Torque, Simulation, Space environmental conditions.

The results of a test program to determine the operational characteristics of dry self-lubricating materials in the extremely low-pressure environment of a space simulator are presented. The test was designed to evaluate the lubrication of gears, pinions, and bearings. Four selected self-lubricating composites fabricated as bearing retainers and idler gears were tested. Three of the composites consisted of a metal matrix, polytetrafluoroethylene (PTFE), and tungsten diselenide (WSe_2); the other consisted only of PTFE and WSe_2. (Author)

AD-406 230 Div. 14, 25
(TISTM/EJH) OTS price $1.60

Frick Chemical Lab., Princeton U., N. J.
VISCOELASTIC PROPERTIES OF A SIMPLE ORGANIC GLASS,
by A. V. Tobolsky and R. B. Taylor. May 63, 9p.
Contract Nonr185807, Proj. NR356 377
ONR TR RLT59 Unclassified report

Descriptors: *Glass, *Transition temperature, *Organic compounds, *Aromatic compounds, Viscosity, Elasticity, Temperature, Relaxation time, Liquids, Mechanical properties, Textiles.

The shear compliance of a three-dimensional glass forming substance, Galex, composed largely of dehydroabietic acid was studied as a function of time and temperature by a ball indentation method. The results are expressed in terms of a master curve of shear compliance against time at 15 C. This curve was analyzed to separate the various components of the compliance, and it was found that a glassy compliance, a single retardation time and steady flow shear viscosity are sufficient to describe the viscoelastic behavior of the compliance over the entire time scale. This is in striking contrast to the broad distribution of retardation times exhibited by polymeric materials. The glass transition temperature was determined by volume temperature measurements and found to be 7 C. The variation of the shear viscosity and the viscoelastic shift factors as a function of temperature are also discussed. (Author)

AD-406 234 Div. 14, 17, 30, 24
(TISTM/PCR) OTS price $1.10

Brown U., Providence, R. I.
EXPERIMENTAL AND THEORETICAL STUDY OF WAVE PROPAGATION AND VIBRATION PROBLEMS,
by J. Duffy and C. Mylonas. May 63, 5p.
Grant DA31 124ARO(D)37, Projs. 2571 E and DA 20010501B700
ARO AROD25713 Unclassified report

Descriptors: *Deformation, *Mechanical waves, Propagation, Theory, Vibration, Coatings, High speed cameras, Metals, Bonding, Photoelasticity, Membranes, Stresses, Epoxy plastics, Casting, Aging (Materials), Test equipment, Solids.

The work was aimed toward the further development of the birefringent coating technique and the construction of a high speed camera and light source to be used in conjunction with the coating. The over-all purpose was to study the deformation of structures, whether they be made of metal or other material, when they are subjected to dynamic loading causing perhaps permanent deformations. With this technique one should be able to observe the waves progressing through the metal structure, whether these waves be elastic or plastic. (Author)

AD-406 237 Div. 14, 17, 26
(TISTM/AMS) OTS price $1.60

Armour Research Foundation, Chicago, Ill.
HIGH TEMPERATURE OXIDATION PROTECTIVE COATINGS FOR VANADIUM-BASE ALLOYS.
Bimonthly rept. no. 4, 13 Mar-12 May 63,
by L. I. Kane, J. J. Rausch, and F. C. Holtz. 7 June 63, 19p.
Contract N600 19 59182
Unclassified report

Descriptors: *Coatings, *Vanadium alloys, High temperature research, Protective treatments, Niobium alloys, Titanium alloys, Silicides, Oxidation, Thickness, Tests, Test methods, Experimental data, Zirconium alloys, Carbon alloys, Deformation, Manufacturing methods.

The influence of thermal history for a standardized pack siliconizing process has been established for 0.020- to 0.030-inch sheet of the V-60w/o Cb-1 w/o Ti alloy. Studies of coating thickness as a function of siliconizing time over the temperature range of 2000 to 2200 F were made. Coating thickness of 2.25 to 2.75 mils appears to offer optimum oxidation protection based on static air oxidation tests at 2200 F; specimens were exposed for more than 500 hours without evidence of failure. Thick coatings (4 mils or greater) suffer gross delamination or severe cracking during elastic bending of sheet materials which results in a loss of protective capability. The thicker coatings also appear to behave poorly in high temperature, thermal cycle oxidation tests in an oxygen-hydrogen torch. (Author)

AD-406 260 Div. 14, 26, 25
(TISTM/AMS) OTS price $.75

California U., Berkeley.
A FUNDAMENTAL STUDY OF THE VARIABLES ASSOCIATED WITH THE MIXING OF CERAMIC RAW MATERIALS,
by D. W. Fuerstenau, R. M. Fulrath and J. A. Pask. Apr 63, 24p.
Contract AF33 616 7763, Proj. 7350, Task 735001
ASD TDR62 732 Unclassified report

Report on Ceramic and Cermet Materials Development.

Descriptors: *Ceramic materials, *Sintering, Mixtures, Powders, Preparation, Surface properties, Aluminum compounds, Oxides, Magnesium compounds, Design, Single crystals, Particle size, Spinels, Crystal growth, Statistical data, Microstructures, Manufacturing methods.

This summary report presents the progress completed on the investigation of the mixing and sintering characteristics of Al2O3 and MgO particles. Separate inter-related areas of research were investigated which include particle preparation, dry and wet mixing, and the sintering behavior of Al2O3 and MgO. The techniques of particle reduction and analysis of particle size distribution were investigated by determining the variables which affect the resulting particles. Emphasis has been placed on control conditions for a jet pulverizer. Variables encountered in the dry mixing operation were found to be the mixer design, loading methods, and sampling methods. Analysis of these variables has been made by determining the standard deviation from a statistical number of samples. Surface properties of Al2O3 and MgO in aqueous media were investigated in order to understand wet mixing behavior. The basic mechanisms and the characteristics of the reaction between MgO and Al2O3 were studied with single crystals. The understanding of the fundamentals of the reaction enabled the establishment of optimum sintering conditions. (Author)

AD-406 461 Div. 14, 26
(TISTM/AMS) OTS price $3.60

New Jersey Ceramic Research Station, Rutgers U., New Brunswick.
DEVELOPMENT OF REFRACTORY CERAMICS THAT CAN BE PROCESSED AT TEMPERATURES CONSIDERABLY LOWER THAN THEIR MAXIMUM USE TEMPERATURE.
Quarterly progress rept. no. 4, 1 Jan-1 Apr 63. 1 Apr 63, 31p.
Contract NOw62 0710d
Unclassified report

Descriptors: *Ceramic materials, *Refractory materials, *Aluminum compounds, Phase studies, Density, Sintering, Impurities, Theory, Low-pressure research, Silicon compounds, Magnesium compounds, Experimental data, Powders, Liquids, Manufacturing methods, Oxides, Ceramic materials.

Part I. The presintering study was initiated to determine the densification mechanisms of a high alumina body utilizing the presintering process, an analysis of phase reactions with regard to equilibrium conditions are shown. Conclusions from the overall study are presented. Part II. A study of the densification of pure alumina, pure alumina with 0.25% MgO and pure alumina containing 2.0% MgO was carried out in a vacuum. Procedures are outlined for the study of the densification of these three compositions in dry hydrogen and dry helium. In addition three other compositions will be used with the three aforementioned compositions to determine the units of solid solution of MgO in Al2O3. Part III. Cordierite compositions were fritted with the frit utilized as the basic raw material. Density and moisture absorption results and devitrification and maturing temperatures are presented. (Author)

AD-406 625 Div. 14, 27, 4
(TISTM/REB) OTS price $2.60

Atlantic Research Corp., Alexandria, Va.
CHEMICAL REACTIONS BETWEEN PROPELLANT GASES AND NOZZLE MATERIALS.
Quarterly progress rept. no. 3, 1 Feb-30 Apr 63, by R. S. Scheffee, Wm. E. West, J. D. Batchelor and E. L. Olcott. 15 May 63, 25p.
Contract NOrd15536
Unclassified report

Descriptors: *Rocket motor nozzles, *Exhaust gases, *Graphite, Niobium compounds, Carbides, Chemical reactions, Tantalum compounds, Nitrogen, Argon, Carbon dioxide, Carbon compounds, Monoxides, Filaments, Manufacturing methods, Pyrolysis, Materials, Solid rocket propellants, Erosion.

Hemispherical specimens of AGOT and ZT graphites were exposed to flowing streams of N, Ar, CO, and CO2 generated by a plasma torch, and erosion rates were determined. It was found that all gases erode the graphites to a substantial extent with CO2 being especially destructive. It is concluded that chemical reaction and mechanical abrasion (drag) are equally important parameters contributing to the over-all erosion rate. Electrically heated filament specimens (25-mil. diameter) of TaC were exposed to CO2 in the high-pressure bomb and in the vacuum reactor. Losses were determined under a variety of test conditions. A technique for fabricating NbC wires was established, and production of filaments for future reaction studies was started. Specimens of pyrolytic graphite are being produced in an arc-image furnace by methane decomposition from flowing streams of methane and N on hemispherical AGOT substrates. (Author)

AD-406 689 Div. 14, 20
(TISTM/EJH) OTS price $3.60

General Dynamics, Fort Worth, Tex.
COMPRESSION-SET BEHAVIOR OF IRRADIATED SILICONE ELASTOMERS,
by E. G. Fritz and P. M. Johnson. 15 May 63, 38p.
NARF 63 2T; MR N 301
Contract AF33 657 7201
Unclassified report

Descriptors: *Silicone plastics, *Elastomers, *Deformation, Radiation damage, Polymers, Copolymerization, Hardness, Gamma rays, Mathematical analysis, Test methods, Compressive properties.

The effect of nuclear radiation (five different dose levels in the range of from 10 to the 8th power to 10 to the 10th power ergs/gm(C)) on the compression-set behavior of three types of silicone elastomers (SE-551, SE-361, and DC-675) was examined. During the irradiation, the samples were compressed at constant strain in an air environment. The observed postirradiation percent compression set after an accumulated dose is described by an empirically derived equation. The ratio of the number of network chains at equilibrium with the unstrained thickness to the number of network chains at equilibrium with the applied strain rapidly decreases with dose.

The Shore-A hardness of these elastomers was observed to increase with dose. Within the dose region investigated, the hardness attained after an accumulated dose can be expressed by an empirically derived equation. (Author)

15. MATHEMATICS

AD-405 910 Div. 15
(TISTP/RLG) OTS price $1.60

Columbia U., New York.
SOME ELEMENTARY TESTS FOR MIXTURES OF DISCRETE DISTRIBUTION,
by Tiago de Oliveira. 1 June 63, 15p.
Contract Nonr266 04
Unclassified report

Descriptors: *Statistical tests, *Statistical analysis, Probability, Management engineering, Operations research, Analysis of variance, Statistical distributions.

AD-405 938 Div. 15
(TISTP/RLG) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
THE MATRIX PSEUDOINVERSE AND MINIMAL VARIANCE ESTIMATES,
by C. M. Price. 25 Mar 63, 14p. TDR169 3550 01TN2
Contract AF04 695 169
SSD TDR63 92
Unclassified report

Descriptors: *Analysis of variance, *Statistical processes, Orbital trajectories, Flight paths, Theory, Matrix algebra.

This paper reviews and applies certain results concerning the matrix pseudoinverse to the general theory of estimable functions and minimal variance estimates. The paper is divided into two sections. The first section reviews and extends certain known results concerning the matrix pseudoinverse. This section is essentially nonstatistical. The second section uses results in the first section to state and prove a generalized version of the Gauss-Markoff Theorem concerning unbiased linear estimates having minimal variance. In the third section, an additional theorem is proven, which together with the preceding material provides a theoretical foundation for parameter estimation in orbit determination work. This foundation is then exploited to provide formulae for such parameters. (Author)

AD-406 147 Div. 15, 18
(TISTP/MFA) OTS price $5.60

George Washington U., Washington, D. C.
NUMERICAL REALIZATION OF ATTRITION GAMES,
by Ross Edgar Tomlinson. 11 Jan 63, 44p.
Serial T 155
Contract Nonr761, Projs. NR345 107 and NR047 001, Tasks 03 and 05
Unclassified report

Descriptors: *Lanchester equations, Boundary value problem, Game theory, Differential equations, Simultaneous equations, Information retrieval, Magnetic tape, Matrix algebra, Strategic warfare, Logistics, Warfare, Probability.

A set of numerical experiments is presented on a class of zero-sum two-person games which are not matrix games. The methods used in the construction and solution of these games are given in detail. The existence of a closely related matrix game is established, certain solutions to both types are exhibited, and properties of the solutions are discussed. (Author)

AD-406 242 Div. 15
(TISTP/FEM) OTS price $8.10

William Marsh Rice U., Houston, Tex.
ASYMPTOTIC VALUES OF HOLOMORPHIC FUNCTIONS,
by G. R. MacLane. 1963, 83p.
AFOSR J485 Unclassified report

Monograph in Mathematics, Vol. 49, No. 1.

Descriptors: *Topology, Algebraic topology, Real variables, Integrals, Geometry, Transformation (Mathematics), Functions.

AD-406 263 Div. 15, 20
(TISTP/FEM) OTS price $3.60

Michigan U., Ann Arbor.
EXISTENCE AND UNIQUENESS THEOREMS FOR THE NEUTRON TRANSPORT EQUATION,
by K. M. Case and P. F. Zweifel. Apr 63, 33p.
Unclassified report

Descriptors: *Neutron transport theory, Integral equations, Neutron reactions, Neutron scattering, Neutron cross sections, Green's function, Integrals, Equations.

In an attempt to understand the conditions under which the neutron transport equation has solutions, and the properties of those solutions, a number of existence and uniqueness theorems are proved. One finds that the properties of the solution are closely related to the boundedness of the source as well as to certain velocity-space integrals of the scattering kernel. Both time-dependent and time-independent equations are considered as are also the time-dependent and time-independent adjoint equations. Although only a very few of all possible existence and uniqueness theorems for these equations are considered here, the work may serve as a guide to the treatment of similar problems. (Author)

AD-406 302 Div. 15, 30
(TISTP/MFA) OTS price $2.60

Israel Inst. of Tech., Haifa.
DECOMPOSITIONS OF FINITE AUTOMATA,
by Michael Yoeli. Mar 63, 20p. TR10
Contract N62558 3510
Unclassified report

Descriptors: *Automation, Sequences, Algebraic topology, Matrix algebra, Algebras.

A short, unified introduction into the algebraic decomposition theory of finite automata (sequential machines) is presented. A further purpose is the study of overlapping partitions of automata state sets in connection with a generalized approach to the decomposition problem. Previously, only output-consistent overlapping partitions of incompletely specified sequential machines were considered in connection with the problem of state reduction. (Author)

AD-406 436 Div. 15, 30
(TISTP/FEM) OTS price $1.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
ROUTINE FOR FINDING ROOTS OF POLYNOMIALS WITH

REAL COEFFICIENTS,
by Tadeusz Leser. Apr 63, 22p.
Proj. 1M010501A003
BRL MR1467 Unclassified report

Descriptors: *Polynomials, *Programming (Computers), Frequency, Vibration, Statistical analysis, Real variables, Mathematics.

A routine that computes the real and the complex roots of polynomials with real coefficients up to the tenth degree is reported. In case of an even polynomial it computes its quadratic factors and solves each factor by the quadratic formula. In case of an odd polynomial it computes one real root by locating it and refining by Newton's algorithm. Then it removes the computed root from the polynomial reducing its degree by one. The reduced polynomial is of even degree and it is solved by quadratic factors. The routine fails when (a) the real roots are of even multiplicity, converging then to wrong values, (b) the real roots are of odd multiplicity, not converging at all, (c) the polynomial is badly conditioned (very small changes in coefficients cause large changes in the values of the roots) converging then to wrong values. The routine is planned to compute frequencies in vibrations problems which involve complex roots. Statistical evidence seems to indicate that only polynomials with real roots can be badly conditioned. If this were the case the handicap (c) would be of minor importance only. (Author)

AD-406 713 Div. 15
(TISTP/MFA) OTS price $4.60

Minnesota U., Minneapolis.
ON TWO-STAGE NON-PARAMETRIC ESTIMATION,
by Elizabeth Y. H. Yen. May 63, 43p. TR26
Contract Nonr71031, Proj. NR042003
Unclassified report

Descriptors: *Functional analysis, Statistical analysis, Series, Inequalities, Distribution theory.

A two-sample, two-stage non-parametric estimation problem is studied. The parameter phi = phi(F, G) under consideration is estimable (i.e., there exists an unbiased estimator which is a function of independent observations from two populations with cumulative distribution functions F(X) and G(Y). (Hence, it is called a two-sample problem.) The functions F(X) and G(Y) will be restricted to be members of a specified class, D, of pairs of cumulative distribution functions, described in the context. The total number of observations from the two populations X and Y will be a fixed number, N. The estimation procedure is carried out in two stages. First, take M observations from each of the populations; then, allocate the remaining N - 2M observations to the same populations. The method of allocation utilizes the information from the first stage observations. (Author)

AD-406 763 Div. 15
(TISTP/FEM) OTS price $7.60

Boeing Scientific Research Labs., Seattle, Wash.
BOUNDS FOR DISTRIBUTIONS WITH MONOTONE HAZARD RATE,
by Richard E. Barlow and Albert W. Marshall.
May 63, 77p. D1 82 0247; MN292
Unclassified report

Also available from author.

Descriptors: *Statistical distributions, *Probability, Statistical functions, Real variables, Integrals, Partial differential equations, Numerical analysis, Numerical methods and procedures, Transformations (Mathematics), Inequalities, Hazards.

AD-406 791 Div. 15, 30
(TISTP/WH) OTS price $1.60

Illinois U., Urbana.
ON-LINE DIGITAL COMPUTATION OF THE VARIANCE OF A TIME SERIES,
by Robert S. Smith. 20 Mar 63, 6p. TN61
Contract Nobsr89229
Unclassified report

Descriptors: *Analysis of variance, *Digital computers, Statistical analysis, Programming (Computers), Direction finding, Radio equipment, Errors, Series.

Statistical variance has been widely used in propagation studies associated with radio direction finding for many years. With the advent at this laboratory of high speed digital computing machinery, it is advisable to explore methods of on and off line calculation of variance, with particular emphasis placed on on-line computations. It is not the purpose of this note to judge whether or not variance is the correct parameter to use, but to find ways for calculating it. (Author)

16. MEDICAL SCIENCES

AD-405 912 Div. 16
(TISTB/CCH) OTS price $1.60

Johns Hopkins U. School of Medicine, Baltimore, Md.
A COMPREHENSIVE STUDY OF VIRAL HEPATITIS.
Annual progress rept., 15 July62-14 July 63,
by Ivan L. Bennett, Jr. 5 June 63, 13p.
Contract DA49 193MD2310
Unclassified report

Descriptors: *Liver viruses, Tissue culture, Histology, Pathology, Medical examination, Cells (Biology), Laboratory animals, Primates, Man, Disease vectors.

A study of viral agents associated with infectious hepatitis in man was made. The study of candidate agents was investigated. A major effort was the study of the virus tissue culture cell system under specified conditions utilizing several cloned lines of D6y cells, infective plasma, and cultures of representative agents. Cytopathic effects were obtained only sporatically and unpredictably. The San Carlos 8 agent was found to multiply readily in a variety of human cell cultures. The observation of others that this agent types as an adenovirus type 16 was confirmed but an antiserum produced in this laboratory against the San Carlos agent appeared to show a one-way (prime) relationship rather than a relationship of identity. CF tests with 10-paired sera from confirmed cases of Korean hepatitis against the San Carlos agent showed positive reactions of 1 in 8 or greater and only

one-half the cases and none showed a significant rise in titer. The histopathologic aspects of viral hepatitis are described. Descriptions of the histologic findings in liver needle biopsies on 100 chimpanzees of various ages and sexes on liver needle biopsies from chimpanzees with so-called 'contact viral hepatitis', and of liver biopsies from human volunteers inoculated with the Parke, Davis agents are described in considerable detail in the main report. (Author)

AD-405 961 Div. 16
(TISTM/DGH) OTS price $3.60

Defense Documentation Center, Cameron Station, Alexandria, Va.
BIOASTRONAUTICS.
June 63, 30p.

Unclassified report

Descriptors: *Space biology, *Space medicine, *Bibliographies, Aviation medicine, Stress (Physiology), Stress (Psychology), Adaptation (Physiology), Weightlessness, Acceleration tolerance, Space flight, Closed cycle ecological systems, Space environmental systems.

AD-405 963 Div. 16
(TISTM/AAR) OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
INHIBITION OF THYMIDINE KINASE - DNA POLYMERASE ACTIVITY IN THE KIDNEY BY X-RADIATION BEFORE OR AFTER UNINEPHRECTOMY,
by R. K. Main, L. J. Cole and E. R. Walwick.
23 Apr 63, 16p.
Task MR005 08 1200
NRDL TR640

Unclassified report

Descriptors: *Kidneys, *Enzymes, *Desoxribonucleic acids, X-rays, Rats, Whole body irradiation, Excision, Radioactive isotopes, Tritiated compound, Inhibition.

Rats were exposed to whole-body X radiation (850 rad) at various times before or after unilateral nephrectomy, and the other kidney was removed 48 hours later. The kidneys were homogenized in isotonic sucrose-tris buffer, and the homogenate was centrifuged at 105,000xg for 1 hour. The supernatants were assayed in vitro for the DNA polymerase enzymes which catalyze the incorporation of H3-thymidine into DNA. The accumulation of these enzymes was profoundly suppressed in rats irradiated at 10 minutes to 18 hours after uninephrectomy; when irradiated between 19 and 24 hours after nephrectomy there was a sharp rise in enzyme activity. When irradiation was carried out between 15 minutes and 22 hours before uninephrectomy, enzyme activity was also profoundly suppressed. The data indicate that the early steps in the induction or formation of the thymidine kinase-DNA polymerase enzyme system are highly radiosensitive. (Author)

AD-405 977 Div. 16
(TISTM/AAR) OTS price $1.10

General Electric Co., Milwaukee, Wis.
STUDIES ON ARBOVIRUS INFECTIONS IN EQUINES.
Annual progress rept. 1 July 62-30 June 63,
by Robert J. Byrne. 30 June 63, 6p.
Contract DA MD49 193 63G69

Unclassified report

Descriptors: *Virus, Equines, Immunity, Birds, Tissue culture, Mice, Rabbits, Chickens, Animals, Antigens and antibodies, Infections.

A series of experiments were conducted in which burros were subjected to multiple exposures to Group A arboviruses. Production of broadly reactive CF antibodies was found to depend on the sequence of different viruses injected. The highest broad spectrum CF reactions appeared in EEE immune burros after challenge with virulent VEE virus. Primary inoculation with EEE, WEE, and VEE gave good specific CF and HAI antibody response. In WEE immune burros, challenged with Sindbis virus, antibody response was insignificant. The immune response of domestic chickens of various ages to inoculation with EEE virus is in progress. Blood virus levels in younger birds were of a higher order and persist longer than in older birds inoculated with the same quantity of virus. Guaroa virus was cultivated on 6 different tissue culture lines. The virus is being characterized and the immunologic response is being measured in mice, rabbits, and chickens. Unsuccessful attempts were made to produce a hemagglutinin to Cache Valley-like virus recently isolated. Of 156 non-vaccinated ponies, neutralizing antibodies to EEE were detected in 40 with HA antibodies to EEE detectable in 19. A serologic survey indicates that a Cache Valley-like virus is rather widely disseminated in domestic animals in the tidewater areas of Maryland and Virginia. (Author)

AD-406 064 Div. 16
(TISTM/WA) OTS price $1.10

Pasadena Foundation for Medical Research, Calif.
CYTOLOGICAL ASPECTS OF INJURY AND REPAIR.
Annual progress rept. 1 Aug 62-28 May 63,
by C. M. Pomerat. 28 May 63, 6p.
Grant DA MD49 193 63G80

Unclassified report

Descriptors: *Medical research, *Dentistry, Anesthetics, Regeneration, Wound and injuries, Pathology, Cells (Biology), Mouth, Blood proteins, Blood serum, Cytochemistry.

AD-406 074 Div. 16
(TISTM/AAR) OTS price $2.40

Rochester U., School of Medicine and Dentistry, N. Y.
STUDIES ON METABOLISM AND MECHANISM OF DESTRUCTION OF THE FORMED ELEMENTS OF THE BLOOD.
Progress rept. for 1 June 62-31 May 63.
31 May 63, 24p.
Contract DA49 007md632

Unclassified report

Descriptors: *Erythrocytes, Blood cells, Lipids, Enzymes, Adenosine phosphate, Blood plasma, Phosphilipids, Dogs, Autoradiography, Phosphorus, Preservation, Tracer studies, Radioactive isotopes, Metabolism.

AD-406 142 Div. 16
(TISTM/WA) OTS price $1.60

Marquette U., School of Medicine, Milwaukee, Wis.
STUDY OF PERIPHERAL CIRCULATION IN THE NORMAL AND THE SHOCKED DOG.
Final technical rept. 1955-1962,
by James J. Smith. 25 May 63, 14p.
Contract DA49 007md591

Unclassified report

Descriptors: *Hematology *Blood circulation, Drugs, Shock, Blood volume, Blood plasma, Blood vessels, Hemorrhage, Sympatholytic agents, Survival, Blood pressure.

AD-406 202 Div. 16
(TISTM/WA) OTS price $1.60

Kentucky U. School of Medicine, Lexington.
THE PHYSIOLOGY OF MECHANICAL TRAUMA.
Annual progress rept., 31 Aug 62-1 June 63,
by Benjamin F. Rush, Jr. 1 June 63, 14p.
Contract DA49 193MD2348
Unclassified report

Descriptors: *Surgery, *Kidney function tests, Shock, Oxygen consumption, Dogs, Physiology, Medical research, Abdomen, Thorax.

Renal plasma flow and filtration rate appeared to increase slightly but significantly after minor abdominal operations. Following large abdominal operations these functions are significantly depressed. Thoracic operations even of great magnitude do not depress renal function presuming that shock has not intervened. Morbidity and mortality in dogs subjected to hemorrhagic shock is diminished by the use of heparin and is also diminished by the omission of all wetable surfaces from the exsanguination and retransfusion system. Methods for measuring oxygen consumption during shock are described and the usefulness of the measurement of this parameter is indicated. (Author)

AD-406 618 Div. 16, 2
(TISTM/SAT) OTS price $.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
INTERRELATIONSHIPS OF COLD EXPOSURE AND AMINO ACID IMBALANCES,
by G. J. Klain, D. A. Vaughan, and Lucile N. Vaughan. Jan 63, 9p.
Proj. 8238 03
AAL TDR62 62 Unclassified report

Descriptors: *Environmental tests, *Amino acids, Growth, Rats, Fibrin, Casein, Transferases, Metabolism disorders, Exposure, Diet, Deficiency diseases.

A moderate cold exposure has been used as a tool in inducing a higher food intake in experiments dealing with amino acid imbalances in the rat. The data indicate that the rats kept at 25 C suffer a severe metabolic disorder after ingesting amino-acid-imbalanced diets. In contrast, the animals kept at 7 C readily consumed the imbalanced diets and, consequently, grew as well as the controls. The activity of the glutamic-oxalacetic and the glutamic-pyruvic transaminase were found to be increased as a result of cold exposure. It is suggested that a moderate cold stress is an effective agent in correcting and overcoming amino acid imbalances. (Author)

AD-406 619 Div. 16
(TISTM/SAT) OTS price $.75

Duke U. School of Medicine, Durham, N. C.
EXPERIMENTAL STUDIES ON PROFOUND HYPOTHERMIA INDUCED AND REVERTED WITH A PUMP OXYGENATOR,
by M. A. Lesage, W. C. Sealy, W. G. Young, Jr., and J. M. Lee. Feb 63, 24p.
Contract AF41 657 312, Proj. 8237 03
AAL TDR62 30 Unclassified report

Descriptors: *Hypothermia, *Mechanical organs, Dogs, Cardiovascular system, Oxygen consumption, Brain, Arrhythmia, Heart, Surgery.

This report covers a summary of 300 animal experiments during profound hypothermia which stresses the acceptable animal survival rate, the favorable metabolic state afforded by this technique, and the protective action of profound hypothermia against even severe oxygen deprivation. The technique of profound hypothermia induced and controlled with a pump oxygenator has been shown to be feasible by these studies and has now been widely accepted for clinical application. It has become increasingly evident that, though long periods of circulatory arrest can be achieved, flow of oxygenated blood ought not to be stopped unless the operation demands it. The basis for this statement rests upon the observations that oxygen is utilized during profound hypothermia. There are few cardiac operations where prolonged circulatory arrest is ever needed. (Author)

AD-406 620 Div. 16
(TISTM/SAT) OTS price $1.25

Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.
THE EFFECT OF INDUCED HYPOXIA ON THERMOREGULATION AND CARDIOPULMONARY FUNCTION,
by T. P. K. Lim and U. C. Luft. Jan 63, 46p.
Contract AF41 657 330, Proj. 8238 20
AAL TDR62 19 Unclassified report

Descriptors: *Hypoxia, *Environmental tests, Respiratory system, Shivering, Tables Exposure, Oxygen consumption, Cardiovascular system, Body temperature.

AD-406 621 Div. 16
(TISTB/DGH) OTS price $4.60

Harvard U. Medical School, Boston, Mass.
CIRCULATION IN MAMMALIAN HIBERNATION,
by C. P. Lyman. Oct 62, 45p.
Contract AF41 657 380, Proj. 8240 25
AAL TDR62 6 Unclassified report

Descriptors: *Blood circulation, *Hibernation, *Mammals, Physiology, Rodents, Bibliographies, Primates.

This review of the control of circulation during hibernation begins with a general description of hibernation as it occurs in various groups of mammals and outlines the difficulties in the physiological study of hibernation. There follows a more detailed description of the three phases of hibernation -- entering hibernation, in deep hibernation, and waking from the hibernating state. The bulk of the review concerns research on rodents, which have been the most intensively studied of the animals which hibernate. It is emphasized that hibernation, at least in this group , is a precisely controlled series of physiological changes in which the animal maintains a homeostatic condition at all times in spite of profound changes in body temperature. (Author)

AD-406 624 Div. 16
(TISTM/SAT) OTS price $.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
EFFECT OF PROTEIN INTAKE AND COLD EXPOSURE ON SELECTED LIVER ENZYMES ASSOCIATED WITH AMINO ACID METABOLISM,
by G. J. Klain, D. A. Vaughan, and Lucile N. Vaughan. Jan 63, 7p.
Proj. 8238 03
AAL TDR62 61 Unclassified report

Descriptors: *Amino acids, *Exposure, Rats, Transferases, Liver, Tissues (Biology), Enzymes, Metabolism, Metabolism disorders.

The activity of five liver enzymes involved in amino acid metabolism was found to be markedly increased in cold-exposed rats. However, the activity of three of the enzymes, arginase, glutamic-oxalacetic and glutamic-pyruvic transaminase, was increased only as a result of a cold-induced higher protein intake. In contrast, the activity of tryptophan pyrrolase and tyrosine alpha ketoglutaric transminase was increased by cold per se. The data demonstrate that both substrate-induced and cold-induced enzymatic changes occur in cold-exposed animals. (Author)

AD-406 686 Div. 16
(TISTM/SAT) OTS price $6.60

Joint Publications Research Service, Washington, D. C.
PROPAGATION AND MIGRATION OF FOUR SPECIES OF STERNA,
by Bertil Kullenberg. 29 Mar 63, 49p.
JPRS R 3028 D; ABL 758 Unclassified report

Trans. from Arkiv for Zoologi, 38-A:17, pp. 1-80.

Descriptors: *Birds, *Ecology, Climatology, Food, Plankton, Hydrology, Ocean currents, Reproduction (Physiology), Distribution.

This paper deals with the distribution and migrations of Sterna hirundo, S. macrura, S. hirundinacea and S. vittata. Primary importance is attached to the distribution and migration routes of S. macrura. The recent distribution of these Sterna-species is seen from the point of view of nourishment, climatological and hydrological factors nowadays and during the quaternary glaciation. S. hirundo and S. macrura seem to have developed from the same origin. The former is adapted to temperate climate; the latter to arctic and subarctic climate. S. macrura is a coastliving bird though in subarctic and arctic territories also breeding at freshwater. Probably S. macrura has developed in the old Bering country and northwesterly North America and from there spread to eastern North America and nothern Eurasia, i.e. in two main directions. So it was adapted to the long days of the arctic summer but was forced to go to the south during the dark northern winter. It is possible that S. vittata has developed from populations of S. macrura remaining in the antarctic and subantarctic waters during the northern summer. As one cause of the suspension of the migration back to the northern breeding territories one can point out the very rich plankton life in the surface water of the southern cold oceans. S. macrura is distributed continuously circumpolar and is not divided into races. At the antarctic and subantarctic islands well isolated populations of S. vittata have settled down; geogaphiraphical races have developed.

AD-406 764 Div. 16
(TISTB/WA) OTS price $.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
CHANGES IN THE INTESTINAL FLORA OF GROUND SQUIRRELS DURING PERIODS OF HIBERNATION,
by J. P. Schmidt and R. E. Becker. Mar 63, 5p.
Proj. 8241 12
AAL TDR62 55 Unclassified report

Descriptors: *Rodents, *Low-temperature research, Bacteria, Intestines, Body temperature, Hibernation.

Counts were made of the coliform bacilli and psychrophilic organisms in the intestinal contents of arctic ground squirrels while the animals were in the active state and again following periods of hibernation. Total viable aerobic cell counts were also obtained. Data are presented which indicate that there was a significant increase in the number of psychrophiles and a simultaneous decrease in the number of coliform bacilli during hibernation. No changes were found in the total cell counts which could be associated with hibernation. (Author)

AD-406 771 Div. 16, 14
(TISTM/WA) OTS price $1.60

Army Prosthetics Research Lab., Walter Reed Army Medical Center, Washington, D. C.
BURN DRESSINGS FROM FOAM ACRYLIC-AMIDE ELASTOMERS. Report no. 2,
by Carl A. Nielson and Gerry N. Wixson. May 63, 15p. TR6307
Proj. 6 59 01 001 04
Unclassified report

Descriptors: *Burns, *Protective coverings, Elastomers, Foams, Composite materials, Medical supplies, Structural properties.

The latest research done on developing a foam acrylic-amide elastomer suitable for a burn dressing is described. Changes in the process procedure are discussed, and a physical evaluation of the samples submitted for surgical inspection is made. (Author)

AD-406 789 Div. 16
(TISTB/WA) OTS price $5.60

Ohio State U., Columbus.
A STUDY OF INTEROCCLUSAL ECCENTRIC PROTRUSIVE JAW RELATION RECORDS,
by Frank Peter Rymarz. 1963, 46p.
Unclassified report

Master's thesis.

Descriptors: *Denistry, *Prosthetics, Teeth, Mouth, Labratory equipment, Medical research, Records, Statistical data.

Several aspects of interocclusal eccentric protrusive jaw relation records were studied to help clarify the value of their use. The findings of this study were: Five dentists did not adjust the horizontal condylar tracks of the articulator to the same setting using the same protrusive record. The variations tended to increase as the amount of protrusion decreased. The adjustment of several protrusive interocclusal eccentric jaw relation records of the same subject did not accurately repeat the same setting of the horizontal condylar tracks of the articulator. The variations that did occur were believed to be due to error in the adjustment of the articulator, differences in position and possibly to muscle tensions while the records were being made. (Author)

AD-406 795 Div. 16
(TISTM/AAR) OTS price $1.10

Pennsylvania U., Philadelphia.
NON-THERMAL EFFECTS OF ALTERNATING ELECTRICAL FIELDS ON BIOLOGICAL STRUCTURES.
Annual progress rept. for 1962.
by Herman P. Schwan, Antharvedi Anne, and Lawrence D. Sher. 1962, 5p.
Contract Nonr55105
Unclassified report

Descriptors: *Alternating current, Particles, Microwaves, Radiation effects, Dielectrics, Fluids, Biology.

A theory of pearl-chain formation, describing, from fundamental physical principles, the process whereby small particles align under the influence of an alternating electrical field, was developed and reported in 1961. It treated two cases by methods which, although difficult, were virtually exact: perfectly conducting particles suspended in a perfect dielectric fluid; perfect dielectric particles suspended in a perfect dielectric fluid The goal in these theoretical studies was to give an expression for the threshold field strength for pearl-chain formation in order to evaluate its biological significance. (Author)

17. METALLURGY

AD-405 939 Div. 17
(TISTM/AMS) OTS price $1.60

Armour Research Foundation, Chicago, Ill.
FIBER-REINFORCED METALS AND ALLOYS.
Bimonthly rept. no. 6, 4 Feb-4 Apr 63.
3 May 63, 7p. B241 6
Contract NOw620650
Unclassified report

Descriptors: *Beryllium, *Reinforcing materials, *Composite materials, *Fibers, Elasticity, Aluminum, Aluminum alloys, Powder metals, Extrusion, Tensile properties, Microstructure, Tables, Tests.

AD-406 056 Div. 17
(TISTM/AMS) OTS price $2.60

Aerojet-General Corp., Azusa, Calif.
INVESTIGATION OF STRESS-CORROSION CRACKING OF HIGH-STRENGTH ALLOYS.
Rept. for 1-30 Apr 63,
by R. B. Setterlund. 30 Apr 63, 23p. L0414 01 23
Contract DA04 4950RD 3069
Unclassified report

Descriptors: *Corrosion, *Steel, *Titanium alloys, Heat treatment, Aging (Materials), Welding, Cold working, Coatings, Protective treatments, Rocket cases, Controlled atmospheres, Nickel alloys, Cobalt alloys, Tensile properties, Hardness, Fracture (Mechanics), Tests, Experimental data, Stresses.

Results obtained to date indicate that the 6A1-4V titanium alloy is immune to stress-corrosion cracking in the annealed, quenched and aged and as-welded conditions. The 20%-nickel maraging steel was found to be highly susceptible to stress-corrosion cracking in the annealed-and-aged condition. Welding and aging the material causes it to become more susceptible; all failures occur in the heat-affected zone of the weld. When the alloy is cold-worked 50 or 75% before aging, the resistance to stress-corrosion cracking is greatly increased. The 18%-nickel maraging steel was also found to be susceptible to stress-corrosion cracking. While the 18%-nickel grade was found to have a longer time-to-failure than the annealed-and-aged 20%-nickel steel in the distilled water, salt water, sea-coast air, trichloroethylene, and 140 F water-saturated air environments, it showed some failures in tap water, chromate solution and soluble oil solutions where the 20%-nickel grade was not affected. It was found that prior cold-working decreased the stress-corrosion cracking susceptibility. Fifteen coating systems designed to prevent stress-corrosion cracking are under evaluation over H-11 steel. The most promising systems are the two inhibited epoxy and one pure vinyl system. (Author)

AD-406 079 Div. 17
(TISTM/BRW) OTS price $19.75

Ladish Co., Cudahy, Wis.
DEVELOPMENT AND STATISTICAL ANALYSIS EVALUATION OF MELTING AND TRANSVERSE PROPERTIES OF HIGH-STRENGTH (H-11 TYPE) STEEL,
Interim engineering rept. no. 4, 23 Sept 62-23 Apr 63,
by Joseph C. Truszynski and Jack A. Yoblin.
May 63, 1v.
Unclassified report

Descriptors: *Steel, Tensile properties, Ductility, Electric arcs, Low pressure research, Vacuum furnaces, Vacuum apparatus, Anisotropy, Experimental data, Statistical analysis, Forging, Forge presses, Degassification, Induction heating, Air, Heat treatment, Melting, Mechanical properties.

Four vacuum arc remelt (VAR) process variations commercially available for the production of high-strength steel were statistically compared in terms of smooth and notch tensile test data developed from transverse and longitudinal specimens removed from 10-in. RCS press-forged billets. Of the four processes, (1) air melt-VAR, (2) air melt-degas-VAR, (3) air melt-double VAR, and (4) vacuum induction melt-VAR, investigated at a 300 Ksi ultimate strength level, the vacuum induction melt-VAR process provided the highest ductility and the most nearly uniform transverse and longitudinal strength and ductility. The air melt-VAR material ranked second in over-all property response and uniformity, although significantly lower than that provided by the vacuum induction melt-VAR process. Air melt-degas-VAR and air melt-double VAR processes ranked third and fourth, respectively, but were not significantly different when compared with air melt-VAR property data. (Author)

Division 17 - METALLURGY

AD-406 103 Div. 17
(TISTM/AMS) OTS price $1.60

Manufacturing Labs., Inc., Cambridge, Mass.
THERMAL-MECHANICAL TREATMENTS APPLIED TO ULTRA HIGH STRENGTH BAINITES.
Progress rept. no. 1,
by D. Kalish and S. A. Kulin. 15 Apr 63, 15p.
Unclassified report

Descriptors: *Bainite, *Steel, Tool steel, Chromium alloys, Stainless steel, Molybdenum alloys, Vanadium alloys, Nickel alloys, Heat treatment, Deformation, Stresses, Aging (Materials), Martensite, Low temperature research, Phase studies, Manufacturing methods.

A program was initiated to determine the effects of thermal-mechanical treatments on the mechanical properties of high strength bainites. Particular concern will be paid to the strengthening mechanisms involved. The three alloys chosen for study are H11, 4340, and 4350. The pertinent transformation characteristics of these steels are being determined. (Author)

AD-406 122 Div. 17, 7
(TISTM/BRW) OTS price $8.60

Westinghouse Electric Corp., Pittsburgh, Pa.
THERMOELECTRICITY.
Quarterly progress rept. no. 3.
Oct 62, 1v.
Contract NObs86595
Unclassified report

Descriptors: *Thermoelectricity, *Intermetallic compounds, Antimony alloys, Tellurides, Tellurium alloys, Bismuth alloys, Cobalt alloys, Germanium alloys, Impurities, Hydrogen, Oxygen, Iron, Tin, Copper compounds, Sulfides, Degasification, Thermal conductivity, Resistance (Electrical), Temperature, Thermal expansion, Reduction (Chemistry), Heat treatment, Microstructure, Transformations, Air conditioning equipment, Materials, Preparation.

Work is continuing on the Co-Sb system to develop a matching 'p' and 'n' material. Thermoelectric property measurements are being extended to higher temperature for the 'n' material, and mechanical property measurements are being made. Material having 'p' type thermoelectric properties over a broad temperature range was made, but the properties are not optimum. Most of the contaminants, present as residuals in the raw materials, and those with which the alloy may come into contact during processing, such as O2 and H2, are 'n' type dopes. The 'p' doping characteristics of Fe and Sn were established. Thermal cycling tests were run to provide further data on the effects of chemistry and processing on the thermal cracking of GeBiTe. Evaluation was made in terms of change in resistance and microstructure. Three Reports are appended: 'Environmental Suit Generator' describes the design, construction, and testing of a thermoelectric heating and ventilating unit;' 'Determination of the Figure of Merit of Thermoelectric Materials' discusses methods for measuring thermoelectric properties and 'The Thermal Conductivity of Molten Cu2S.25-Te.7 and Molten Cu2S presents a review of the method and the results of measurements. (Author)

AD-406 145 Div. 17
(TISTM/AMS) OTS price $3.60

Belfour Engineering Co., Suttons Bay, Mich.
FATIGUE OF METALS. ALUMINUM. SECTION III.
May 63, 26p.
Contract AF33 657 9149, Proj. 7381, Task 738103
ASD TN61 117P5
Unclassified report

Descriptors: *Aluminum alloys, *Fatigue (Mechanics), Stresses, Tensile properties, Tests, Experimental data, Data, Magnesium alloys, Zinc alloys, Data processing systems, Alloys.

The graphs presented herein display metals fatigue information from various sources of published and unpublished test reports which have been processed and regenerated through a semi-automatic data processing system. Each graph includes a legend which identifies the material, test procedure, test conditions and the most significant test and/or material variables associated with the plotted data. The data displayed on these graphs are intended to answer very general questions and to serve as a guide to further investigation of specific areas within the subject presented. (Author)

AD-406 167 Div. 17
(TISTM/AMS) OTS price $1.50

Massachusetts Inst. of Tech., Cambridge.
METALLURGICAL ASPECTS OF FRACTURE AT HIGH STRENGTH LEVELS. Final technical rept.,
by Walter A. Backofen and Merrill L. Ebner.
May 63, 49p.
Contract DA19 020ord5235, Proj. 5B93 32 004
WAL TR310 24 5 4 Unclassified report

Descriptors: *Fracture (Mechanics), *Steel, Hardness, Heat treatment, Toughness, Ductility, Mathematical analysis, Experimental data, Stresses, Microstructure, Grain structures (Metallurgy), Shear stresses, Fractography, Equations, Tensile properties, Elasticity.

The plane-strain fracture toughness of quenched and tempered AISI 4340 steel was measured in tension at room temperature with circumferentially notched and fatigue-cracked specimens. Values of G(IC) for indicating the variation encountered were 5.6, 23, and 254 in-lbs/sq in. after tempering at 212, 400, and 800 F, respectively. Cracking characteristics were influenced by tempering temperature. Below about 700 F, little stable crack growth was found and propagation occurred in a mixed mode that appeared to consist at least partly of cleavage fracture. At higher temperatures, initial cracking was stable and developed by a ductile shear process; rapid fracturing again occurred in a mixed mode. After tempering at 1000 F and above, fracture was ductile. (Author)

AD-406 172 Div. 17, 4
(TISTM/EJH) OTS price $.50

Watertown Arsenal Labs., Mass.
AMPEROMETRIC TITRATIONS. I. DETERMINATION OF TRACE AMOUNTS OF VANADIUM IN STEELS AND CAST IRONS,
by Frederick P. Valente and George H. Carey.
Mar 63, 19p.
DA Proj. 1A0 10501B101
WAL TR823 3 1 Unclassified report

Descriptors: *Steel, *Iron, *Vanadium, *Chemical analysis, Volumetric analysis, Electrochemistry, Chromium.

An amperometric titration method was developed for the determination of trace amounts of vanadium in steels and cast irons. This method does not require chemical separations, except in the case when more than 3% chromium is present, and may be used on the solution remaining from a routine chromium determination by visual titration. The method is applicable down to the 0.0002% level. (Author)

AD-406 245 Div. 17, 25
(TISTM/BRW) OTS price $5.60

Battelle Memorial Inst., Columbus, Ohio.
INVESTIGATION OF THE RELATIONSHIP OF TWINNING TO BRITTLE FRACTURE OF REFRACTORY METALS,
by C. N. Reid, A. Gilbert, and G. T. Hahn.
Apr 63, 48p.
Contract AF33 657 7376, Proj. 7351, Task 735101
ASD TDR63 360 Unclassified report

Descriptors: *Symmetry (Crystallography), *Heat resistant metals and alloys, Molybdenum, Molybdenum alloys, Rhenium alloys, Niobium, Single crystals, Grain structure (Metallurgy), Cryogenics, Low temperature research, Compressive properties, Tensile properties, Deformation, Metallic crystals, Shear stresses, Heat treatment, Impurities, Carbon, Hydrogen, Nitrogen, Oxygen, Brittleness, Ductility, Stresses, Electron microscopy, Fractography, Microscopy, Microstructure, Crystal structure, Hot working, Crystal lattice defects, Fracture (Mechanics).

The first year's work on this program is reported. It is concluded that there is good evidence for brittle fracture induced by mechanical twinning in single crystals and polycrystalline Mo-C with grain sizes larger than 0.40 mm. However there is no evidence for such failures in Mo-C of grain size smaller than 0.25 mm, or in high-purity Cb. The effect of recrystallization texture on twinning is demonstrated, and the orientation dependence of twinning in Cb crystals is reported; a most unusual plastic instability is described in crystals of one orientation. It is shown that twinning in Mo-35Re occurs in bursts, which form in less than 2 mu sec; nucleation of twins occurs only at small strains but lateral growth takes place up to at least 12% strain. (Author)

AD-406 257 Div. 17, 26
(TISTM/AMS) OTS price $1.10

General Dynamics Convair, San Diego, Calif.
MATERIAL - COBALT BASE ALLOY - L-605 SPOT WELD STRENGTHS (AN ABSTRACT REPORT),
by C. W. Alesch. 19 Apr 63, 5p. 8926 173
Contract AF33 657 8926
Unclassified report

Descriptors: *Cobalt alloys, *Spot welds, *Welds, Sheets, Tensile properties, Shear stresses, Cleaning, Chromium alloys, Tungsten alloys, Nickel alloys, Experimental data.

Annealed, 0.031 in. and 0.050 in. thick, mill annealed (2250 F, water quench), L-605 (Haynes Alloy No. 25, Haynes Stellite Co.) was cleaned by the methods given and then spot welded. The 0.031 in. thick sheet was welded according to the schedule given, and the 0.050 in. thick according to the schedule. The results from tests with spot welds in mill-annealed and re-annealed (1975 F, 30 minutes, rapid air cool) conditions are shown. These data show that spot weld strengths optimize when mill-annealed material is welded without subsequent heat treatment. Annealing (1975 F, 30 minutes, air cool) generally reduces weld strengths, especially the cross-tension strength, and thus contributes to reductions in tension-shear to cross-tension strength ratios. (Author)

AD-406 258 Div. 17, 26
(TISTM/AMS) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
FUSION WELD STRENGTHS,
by C. W. Alesch. 19 Apr 63, 4p. 8926 171
Contract AF33 657 8926
Unclassified report

An abstract report on Material - Nickel Base Alloy - Hastelloy R-235, Haynes Stellite Co.

Descriptors: *Nickel alloys, *Welds, Cold working, Heat treatment, Aging (Materials), Sheets, Tensile properties, Experimental data, Mechanical properties.

AD-406 265 Div. 17, 26
(TISTM/AMS) OTS price $1.10

General Dynamics/Convair, San Diego, Calif.
SPOT WELD STRENGTHS,
by C. W. Alesch. 19 Apr 63, 7p. 8926 172
Contract AF33 657 8926
Unclassified report

An abstract report on Material - Nickel Base Alloy - Hastelloy R-235, Haynes Stellite Co.

Descriptors: *Nickel alloys, *Spot welds, *Welds, Cleaning, Cold working, Aging (Materials), Sheets, Tensile properties, Experimental data, Heat treatment, Pickling, Spot welding, Mechanical properties.

AD-406 309 Div. 17, 25
(TISTA/LSK) OTS price $12.00

Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE RESPONSE OF CYLINDRICAL SHELLS TO EXTERNAL BLAST LOADING,
by William J. Schuman, Jr. Mar 63, 174p.
RDT & E Proj. 1M010501A006
BRL MR1461
Unclassified report

Descriptors: *Cylindrical bodies, Structural shells, Shock waves, Deformation, Mathematical prediction, Loading (Mechanics), Elasticity, Blast.

A method of predicting permanent deformation of thin-walled, unstiffened cylindrical shells to external blast loading from charges of high explosives is presented. Empirical relations are derived from a series of firings conducted at Aberdeen Proving Ground against scaled shells. The average deviation between the predicted and the actual blast pressures required for permanent deformation is 12%. (Author)

AD-406 310 Div. 17
(TISTM/BRW) OTS price $2.75

Crucible Steel Co. of America, Pittsburgh, Pa.
RESEARCH AND APPLICATION ENGINEERING TO DETERMINE THE EFFECT OF PROCESSING VARIABLES ON CRACK PROPAGATION OF HIGH-STRENGTH STEELS AND TITANIUM.
Rept. for Apr 61-Aug 62,
by B. R. Banerjee and J. J. Hauser. Apr 63, 137p.
Contract AF33 616 8156, Projs. 7351; 7381,
Tasks 735105; 738103
ASD TDR62 1034 Unclassified report

Report on Metallic Materials and Materials Application.

Descriptors: *Steel, *Stainless steel, *Titanium alloy, Microstructure, Fracture (Mechanics), Austenite, Vanadium alloys, Chromium alloys, Aluminum alloys, Fractography, Tensile properties, Heat treatment, Grain

structure (Metallurgy), Carbides, Melting, Bainite, Martensite, X-ray diffraction analysis, Transition temperature, Toughness, Phase studies, Electron microscopy, Hardness, Cold working, Hot working, Transformation, Mechanical properties.

This report describes in detail the fine-structural characterizing of several high-strength steels (AISI 4340, Type H-11 (Crucible 218), Type 422 stainless, work-hardened Type 301 stainless, PH15-7Mo semiaustenitic stainless, and B-120VCA beta titanium alloy) and gives the relationship of these structures to smooth and notch strength properties. The fine structures of these materials were characterized and correlated with strength and fracture properties to an extent never before achieved. (Author)

AD-406 445 Div. 17
(TISTM/AMS) OTS price $1.00

Frankford Arsenal, Philadelphia, Pa.
FRACTURE CHARACTERISTICS OF ALUMINUM ALLOYS WETTED WITH LIQUID ZINC AMALGAM,
by B. J. Rogus. Apr 63, 33p.
FA R1678
Unclassified report

Descriptors: *Mercury alloys, *Aluminum alloys, Brittleness, Time, Liquid metals, Tensile properties, Test methods, Stresses, Cladding, Microstructure, Experimental data, Zinc alloys, Fracture (Mechanics).

Fracture strength determinations were made on sheet specimens of aluminum alloys 1100, 2024, 5456, 6061, and 7075 in different conditions of temper after wetting with a liquid 2% zinc amalgam. Tests at ambient temperature disclosed that the wetted fracture strength of the alloys decreased with increasing time of wetted contact with the amalgam before stressing. This time dependence was most pronounced for alloys in the precipitation hardened condition in comparison to that for the same alloys in the annealed state or others in strain hardened tempers. Once wetting had been effected, there was a continued physical dissolution attack of the aluminum alloys by the amalgam. This attack, however, was not directly related to the noted time dependence of the wetted fracture strengths. (Author)

AD-406 446 Div. 17
(TISTM/AMS) OTS price $.75

Frankford Arsenal, Philadelphia, Pa.
DELAYED FRACTURE OF ALUMINUM ALLOYS BY LIQUID ZINC AMALGAM,
by B. J. Rogus. Apr 63, 27p.
FA R1677 Unclassified report

Descriptors: *Aluminum alloys, *Mercury alloys, Dispersion hardening, Brittleness, Stresses, Tensile properties, Test methods, Experimental data, Microstructures, Liquid metals, Fracture (Mechanics), Zinc alloys.

Delayed fracture studies were conducted on sheet specimens of aluminum alloys 2024 and 7075 in different conditions of temper upon wetting with a liquid 2% zinc amalgam. Delayed fracture data obtained at ambient temperature showed behavior characteristic of this type phenomenon in that the time to failure under sustained load varied inversely to the magnitude of applied stress. Tests on alloys 2024 and 7075 in the precipitation hardened condition revealed that embrittlement could occur rapidly at stress levels below the yield strength of the material while similar tests on these alloys in the annealed state showed that brittle fracture could not be induced at sub-yield stress levels regardless of time held at stress. (Author)

AD-406 629 Div. 17
(TISTM/BRW) OTS price $.75

Metals and Ceramics Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
FATIGUE OF COPPER-ZINC ALLOYS AT 100 K.
Rept. for Jan-Oct 62,
by J. A. Roberson and J. C. Grosskreutz. Apr 63, 21p.
Proj. 7351, Task 735106
ASD TDR 63 252 Unclassified report

Descriptors: *Copper alloys, *Zinc alloys, Low temperature research, Mechanical properties, Crystal lattice defects, Hardening, Mechanical working, Plasticity, Deformation, Theory, Tensile properties, Cryogenics, Stresses, Brass, Fatigue (Mechanics).

Fatigue tests were conducted to determine the S-N diagrams for a series of copper-zinc alloys at 100 K. An attempt was made to relate the endurance limit behavior to both stacking fault energy and yield strength, but no simple relationship was found. It is suggested that high stacking fault energy increases the cyclic work hardening rate by increasing the probability of dislocation intersection and jog formation. The increase in work hardening rate is reflected in a decrease in plastic strain amplitude, and a subsequent increase in fatigue life. The arguments are bounded on one side by considerations of the yield strength of the alloys, and on the other side by consideration of the dominant mechanisms operative in short and long life fatigue. (Author)

AD-406 688 Div. 17, 25, 26
(TISTM/AMS) OTS price $.75

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
PREPARATION AND EVALUATION OF HIGH PURITY BERYLLIUM.
Quarterly progress rept. no. 1, 15 Jan-14 Apr 63,
by G. E. Spangler, M. Herman, E. J. Arndt, D. B. Hoover, V. V. Damiano and others. 14 Apr 63
22p. Q B2089 1
Contract NOw62 0536
Unclassified report

Descriptors: *Beryllium, *Mechanical working, *Manufacturing methods, Single crystals, Crystals, Diffusion, Electron microscopy, Zone melting, Gamma rays, Purification, Automation, Copper alloys, Beryllium-alloys, Shear stresses, Hot working, Microstructure, Heat treatment, Grain structure (Metallurgy), Ductility, Brittleness, Theory, Experimental data, Mathematical analysis, Equations, Test methods, Gamma-ray absorption coefficients, Deformation.

Contents:
Zone refining
  Zone melting
  Automating device
Single crystal studies
Polycrystalline studies
Electron transmission microscopy
Self-diffusion in beryllium
  Self-absorption of beryllium gamma-radiation

AD-406 693 Div. 17, 25
(TISTM/BRW) OTS price $3.60

Du Pont De Nemours, E. I. and Co., Inc., Wilmington, Del.
THERMOELECTRIC PROPERTIES OF SELENIDES AND TELLURIDES OF GROUPS VB AND VIB METALS AND THEIR SOLID SOLUTIONS.
Quarterly rept. no. 7, 1 Jan-30 Mar 63, by W. T. Hicks and H. Valdsaar. 1 May 63, 30p.
Contract NObs84824, Proj. SR 007 12 01, Task 802
Unclassified report

Descriptors: *Selenides, *Tellurides, *Semiconductors, Intermetallic compounds, Tungsten alloys, Selenium alloys, Lead alloys, Tellurium alloys, Impurities, Tantalum, Sodium, Electrical properties, Group V elements, Group VI elements, Metals, High temperature research, Resistance (Electrical), Thermal conductivity, Thermocouples, Thermoelectricity, Materials.

Calculations were made of idealized efficiencies for various operating conditions and geometries of thermoelectric modules with segmented elements of Ta-doped WSe2 in combination with Na-doped PbTe, encapsulated in constantan cylinders serving as the n-type element. These calculations followed a 704-Computer program developed in another organization. An efficiency of 9.6% was calculated for the combination W0.98Ta0.02Se2 and PbTe + 0.3 at .% Na operating in the gradient 1000 to 25 C. The power per unit volume is 0.47 w/cc compared with 0.19 w/cc for PbTe-based modules. Studies of improved preparative techniques for the diselenides were continued, and doped lead telluride specimens were obtained for assembly into test modules for direct experimental measurement of efficiencies in an apparatus now completed. Observations on the thermal decomposition of WSe2 indicate a measurable pressure of Se at 400, which remains considerably below 1 atm at 100 C. (Author)

AD-406 757 Div. 17
(TISTM/BRW) OTS price $10.50

Battelle Memorial Inst., Columbus, Ohio.
INVESTIGATION OF TANTALUM AND ITS ALLOYS.
Report for 1 Apr 62-28 Feb 63, by Frank F. Schmidt, Edwin S. Bartlett, and Horace R. Ogden. May 63, 128p.
Contract AF33 657 7927, Proj. 7351, Task 735101
ASD TDR62 594, pt. 2 Unclassified report

Report on Metallic Materials.

Descriptors: *Tantalum alloys, *Dispersion hardening, Molybdenum alloys, Tungsten alloys, Hafnium alloys, Zirconium alloys, High-temperature research, Melting, Rolling mills, Heat treatment, Mechanical properties, Ductility, Stresses, Rupture, Recrystallization, Welding, Microstructure, Rhenium alloys, Ruthenium alloys, Carbon alloys, Cryogenics, Low-temperature research, Transition temperature, Hardening.

Minor (1 to 2%) reactive metal (Zr, Hf) additions to Ta-W-Mo alloys effect pronounced strengthening at 1925 C (3500 F) with minimal degradation of low-temperature alloy behavior. Additions of carbon to alloys containing reactive metals degrade both 1925 C (3500 F) strength and low-temperature behavior; however, ZrC dispersions exhibit pronounced strengthening at lower temperatures (1480 C (2700 F)). Solution-process anneals for alloys containing ZrC dispersion greatly increase strength at 1480 C (2700 F), but seriously impair fabricability and ductility. Mo is a less effective strengthener than W as an alloying addition to tantalum. W additions provide higher stress-rupture strengths with less degrading effects on low-temperature ductility than do equivalent atomic percentages of molybdenum. Welding increases the ductile-to-brittle transition temperature of Ta-W-Mo alloys by 300 to 500 C (540 to 900 F). Re and Ru additions showed little or no superiority to W as solid-solution strengtheners, when both high- and low-temperature effects were considered. (Author)

AD-406 761 Div. 17, 26
(TISTM/AMS) OTS price $1.60

Illinois Inst. of Tech., Chicago.
ANNEALING STAGES IN EXPLOSIVELY DEFORMED COPPER, by Paul Gordon, Donald Brillhart and Arnold Preban. May 63, 12p. TR12
Contract Nonr140603
Unclassified report

Descriptors: *Copper, *Heat treatment, *Explosive forming, Grain structures (Metallurgy), Transition temperature, Hardness, Density, Deformation, Experimental data.

OFHC copper, explosively deformed at pressures from 75 to 435 kilobars, was found to anneal in several different stages -- a recrystallization stage proceeded by three to four recovery stages. The first recovery stage, at temperatures under 100 C, is marked by an appreciable decrease in density rather than by a density increase as is normally expected in annealing. A sample of high purity copper deformed in tension exhibited at least three of the four recovery stages, including the first stage with its accompanying decrease in density. Evidence was also found that the explosively deformed samples contained high residual internal stresses and, at pressures of 250 kbars and above, a significant gradient in imperfection structure in the deformation direction. This gradient affected the rate of recrystallization but not the prerecrystallization hardness. (Author)

AD-406 769 Div. 17, 27
(TISTM/BRW) OTS price $1.10

Aerojet-General Corp., Azusa, Calif.
INVESTIGATION OF STRESS-CORROSION CRACKING OF HIGH-STRENGTH ALLOYS.
Monthly progress rept. no. 24, 1-31 May 63, by R. B. Setterlund. 31 May 63, 6p. L0414 01 24
Contract DA04 495ord3069
Unclassified report

Descriptors: *Alloys, *Steel, *Titanium alloys, Stresses, Fracture (Mechanics), Aluminum alloys, Vanadium alloys, Nickel alloys, Cobalt alloys, Corrosive gases, Corrosive liquids, Failure (Mechanics), Fractography, Mechanical properties, Heat treatment, Coatings, Protective treatments, Rocket cases, Air, Water vapor, Environmental tests, Corrosion.

Four groups of specimens of vacuum-cast 9%-Ni 4%-Co steel were placed in test. The material was tested at three strength levels attained by double-tempering at 400, 600 and 800 F. Material at each strength level was exposed to four environments: aerated distilled water, aerated tap water, aerated salt water, and 140 F water-saturated air. The chemical and physical properties of the material are tabulated. Results show that the only failures have occurred in the 140 F water-saturated air environment. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-405 930 Div. 18
(TISTP/RLG) OTS price $9.10

Stanford Research Inst., Menlo Park, Calif.
LINCOLN SHELTER UTILIZATION STUDY. VOLUME II.
A SHELTER ASSIGNMENT PROCEDURE,
by Angelo Gualtieri and Gordon F. Jensen.
Apr 63, 90p. OAD RM106
Contract OSC OS62 135
Unclassified report

Original contains color plates; all DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: *Shelters, *Population, *Civil Defense systems, Mapping, Data processing systems, Statistical analysis, Costs, Behavior, Radioactive fallout, Distribution.

This is Vol. II of a report entitled Lincoln Shelter Utilization Study. Vol. I is entitled 'A Review of the Requirements of Shelter Utilization Planning.' This second report deals specifically with a step-by-step process of assigning the population of Lincoln, Nebraska to fallout shelters. The techniques developed therein can readily be applied to numerous cities having characteristics similar to those of Lincoln, Nebraska. Large census tract maps can be designed and used in assigning blocks of people to shelters. Methods of developing day and nighttime population data for any given city are described. A technique of putting the shelter assignment on data-processing cards for information retrieval is discussed. Methods of sorting punched cards into useful shelter assignment reports are presented. Considerable attention is given to demonstrating the numbers of people who would be sheltered under three separate warning times. Certain rules, based on the natural behavior of people, are developed as an aid in the assignment process. Estimates of cost and effort expended are provided as a guide to any CD official who would desire to use the technique described therein. (Author)

AD-405 948 Div. 18
(TISTP/MH) OTS price $9.60

Stanford Research Inst., Menlo Park, Calif.
LINCOLN SHELTER UTILIZATION STUDY. VOLUME 1.
A REVIEW OF THE REQUIREMENTS FOR SHELTER UTILIZATION PLANNING,
by Gordon F. Jensen, Angelo Gualtieri, W. A. Runge, and B. Greenberg. Apr 63, 96p. OAD RM106 V1
Contract OSC OS62 135
Unclassified report

Original contains color plates: All DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: *Shelters, Buildings, Radio communication systems, Transportation, Education, National Defense, Radio equipment, Defense systems, Operation, Telephone communication systems, Civil Defense systems.

This report assesses the situation with regard to Civil Defense in Lincoln, Nebraska. Lincoln is a typical mid-western city and representative of many cities in the United States. As a result, the subjects treated in this report are applicable to many cities. The serious problem of insufficient existing buildings suitable for use as shelters is considered. A solution involving the use of buildings with lower protection factors and a mobility system after attack is proposed. A radio communications system suitable to the needs of the area is proposed and discussed. A method of assigning people to shelters is demonstrated. A series of maps is developed which aid in making the shelter assignments. A separate and supplemental report, Volume II of this study entitled ''LINCOLN SHELTER UTILIZATION STUDY - A Shelter Assignment Procedure,'' has been issued, and provides a specific assignment of the people of Lincoln to existing shelter and shows the need for additional shelter. (Author)

AD-405 956 Div. 18
(TISTM/DGH) OTS price $2.60

Defense Documentation Center, Cameron Station, Alexandria, Va.
RECONNAISSANCE.
June 63, 24p.
Unclassified report

Descriptors: *Aerial reconnaissance, *Bibliographies, *Aerial photography, *Photographic reconnaissance, Photo interpretation.

AD-406 216 Div. 18, 12, 30
(TISTM/WA) OTS price $9.60

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
APPLIED RESEARCH PROGRAM AEROSPACE INTELLIGENCE DATA SYSTEM (AIDS). VOLUME I.
Quarterly rept. no. 4 for period ending 24 May 62.
24 May 62, 109p.
Contract AF19 626 10
Unclassified report

Descriptors: *Data processing systems, *Technological intelligence, Reading machines, Pattern recognition, Computer storage devices, Information retrieval, Mathematical analysis, Classification, Machine translation.

The design philosophy of an adjunctive equipment group (AN/GYA-( )) to be employed in developing an on demand computer service capability with a large data processor is described. A technical paper discusses evaluating search time bounds for various probability distributions of the file location of stored information and several search strategies. The theoretical basis is established, in this report, for a procedure of sampling files in order to estimate (with confidence levels obtained) the number of filed items having some specified characteristics in common. (Author)

AD-406 225 Div. 18, 24
(TISTP/JW) OTS price $10.50

Litton Systems Inc., Waltham, Mass.
SEMI-AUTOMATIC TARGET RECOGNITION DEVICE.
Final rept.,
by A. Manevitz and G. Sebestyen. 12 Jan 63, 122p.
Contract AF30 602 2494, Proj. 6244, Task 624408
RADC TDR63 74 Unclassified report

Descriptors: *Target recognition, *Data processing systems, Scanning, Aerial photography, Feasibility studies, Aerial reconnaissance, Computers.

A summary of the work to develop techniques for machine recognition of targets on aerial reconnaissance photographs and to construct a device

which demonstrates the feasibility of these techniques is presented. The results of the study phase of this procurement led to the choice of a parametric approach to target recognition and the decision to employ both electronic and electro-optical means to extract the necessary parameters. The Semi-Automatic Target Recognition Device (SATRD) developed on this contract utilizes a flying spot scanner with a rotating raster to extract parameters related to target texture and a two-channel area-matching optical system to detect specific shapes. An automatic learning and recognition computer program was utilized to evaluate the electronic parameter data extracted from a set of 150 aerial photographs, consisting of 15 samples of each of 10 strategic target classes. Due to a lack of sufficient light output from the scanner, optical parameters were not extracted from the set of aerial photographs. However, results are reported on a series of experiments that indicate the feasibility of area matching for the detection of specific shapes--with special applicability to the recognition of tactical targets. (Author)

AD-406 251 Div. 18, 15, 30
(TISTM/PCR) OTS price $11.00

Minneapolis-Honeywell Regulator Co., Minn.
COMMAND AND CONTROL SYSTEMS ANALYSIS.
Final rept.,
by R. C. Kiene, A. R. Butz, and L. B. Winrich.
Dec 62, 142p. 1539TR1
Contract AF30 602 2752, Proj. 5581, Task 558102
RADC TDR62 612 Unclassified report

Descriptors: *Command and control systems, *Operations research, *Mathematical models, Statistical analysis, Digital computers, Game theory, Decision making, Combinatorial analysis, Sensitivity, Computers, Display systems, Programming (Computers), Mathematical analysis, Analysis, Air Defense Command.

Systems analysis procedures are important for determining the proper allocation of information handling and decision making functions among the men in large man-machine organizations such as military command and control systems. Research is required for modeling and analyzing these functions and relating the sensitivities of these functions to the system criterion. This report presents the steps of a generalized systems analysis procedure for command and control systems. The steps are then followed utilizing an existing SAGE Direction Control system as a vehicle for the study. Emphasis is placed upon modeling the human organization as a whole. (Author)

AD-406 363 Div. 18, 24
(TISTM/WA) OTS price $7.60

General Precision Lab. Inc., Pleasantville, N. Y.
AUTOMATIC STEREO PERCEPTION OF AERIAL PHOTOGRAPHY BY MEANS OF OPTICAL CORRELATION.
Final technical rept., 8 Mar-30 Nov 62,
by L. I. Goldfischer and R. Vesper. Dec 62, 70p.
A27 3
Contract DA44 009eng4966, Task ST35 12 001 02A
Unclassified report

Descriptors: *Aerial photography, *Correlation techniques, Space perception, Optical phenomenon, Detectors, Photogrammetry, Instrumentation, Correlators, Mathematical analysis.

The following studies are included in this report: a discussion of the principles of optical correlation and the application to stereo measurements; a description of some potential stereo correlator instrumentations; a study of the behavior of the autocorrelation function as the sample size is reduced; a comparison of stereo measurements under three different conditions, and an investigation of improved configurations. The principal result is that optical correlation is suitable for stereo measurements. (Author)

AD-406 442 Div. 18
(TISTM/SAT) OTS price $2.60

RAND Corp., Santa Monica, Calif.
RECENT DEVELOPMENTS IN THE SOVIET CIVIL DEFENSE PROGRAM,
by Leon Goure. June 63, 26p. P2752
Unclassified report

Presented to Subcommittee No. 3 of the Armed Services Committee of the House of Representatives, Washington, D. C., June 17, 1963.

Descriptors: *Civil defense systems, Training, Shelters, Military strategy, Foreign policy, Military organizations, Warfare, Analysis.

The Soviet civil defense program is far from complete and suffers from a variety of shortcomings. Apart from the notorious inefficiency of Soviet administration, there is the relatively short time that many persons will be able to remain in shelters, because of limited food supplies. Great crowding and absence of cooling equipment will force large numbers of them to evacuate their shelters via contaminated areas while the radiation level may still be fairly high. The Soviets recognize that the effectiveness of civil defense, surviving the attack, and winning the war will depend to a great extent on their ability to blunt or weaken the enemy's attack. This is why Soviet doctrine also emphasizes pre-emptive attacks as well as the importance of anti-aircraft and anti-missile defense. Despite the present inadequacies of Soviet civil defense and the growing destructiveness of modern weapons, the Soviet leadership believes that the preservation of the Soviet state and society in the event of a war merits considerable efforts and the expenditure of relatively scarce money and resources. In the author's opinion, the available evidence leaves no doubt that the Soviet Union is engaged in an extensive civil defense program and that it believes it to be worth further efforts and continued investments.

19. NAVIGATION

AD-405 953 Div. 19, 32
(TISTP/WA) OTS price $1.10

Defense Documentation Center, Cameron Station, Alexandria, Va.
NAVIGATION AND GUIDANCE.
June 63, 5p.
Unclassified report

Descriptors: *Navigation, *Bibliography, Guidance, Geophysics, Gyroscopes, Radio equipment, Direction finding, Radio homing, Abstracts, Analog computers, Space navigation, Radar.

AD-406 113 Div. 19, 15
(TISTP/FR) OTS price $.50

Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MECHANIZATION EQUATIONS FOR A SCHULER-TUNED

INERTIAL NAVIGATION SYSTEM VERTICALLY ALIGNED TO THE MASS-ATTRACTION GRAVITY VECTOR.
Final rept., Sep-Dec 62,
by Philip C. Staas, Jr. Apr 63, 13p.
ASD TDR63 168 Unclassified report

Descriptors: *Inertial navigation, Acceleration, Velocity, Gravity, Equations.

A navigation scheme is investigated that uses a Schuler-tuned inertial platform that is maintained orthogonal to the mass-attraction gravity vector. The expressions for platform acceleration and velocity are developed, and a mechanization to achieve navigation is determined. Results indicate that an inertial platform that is not torqued in the vertical axis can be readily mechanized to seek a mass-attraction vertical and to accomplish navigation on earth. (Author)

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-405 962 Div. 20, 3
(TISTP/WA) OTS price $3.60

Defense Documentation Center, Cameron Station, Alexandria, Va.
WEAPONS.
June 63, 28p.
Unclassified report

Descriptors: *Bibliography, *Weapons, Abstracts, Chemical warfare, Biological warfare, Civil defense systems, Military personnel, Nuclear weapons, Nuclear warfare, Radiological contamination.

AD-406 070 Div. 20, 14, 17
(TISTP/WA) OTS price $5.60

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST. ABSTRACTS. PART I.
Rept. for 1-30 Apr 63.
15 May 63, 56p. AL63
Contract AF33 657 10085, Projs. 7381 and 7634
Unclassified report

Descriptors: *Bibliography, *Materials, Ceramic materials, Organic materials, Propellants, Space environmental conditions, Metals, Electronic equipment, Textiles, Radiation damage.

AD-406 102 Div. 20, 15
(TISTP/MH) OTS price $8.10

Lockheed Aircraft Corp., Sunnyvale, Calif.
ANALYSIS OF ARGUS BOMB DEBRIS - MATHEMATICAL MODEL.
Final rept., 1 June 61-21 Dec 62,
by R. K. M. Landshoff. Feb 63, 81p. LMSC B007043
Contract AF29 601 4419, Proj. 7811, Task 78049
AFSWC TDR62 127, Vol. 2
Unclassified report

Descriptors: *Radioactive fallout, *Models, Nuclear particles, Nuclear physics, Nuclear explosions, Radiological contamination, Statistical analysis, Probability, Stochastic processes, Fission, Fission products, Nuclear bombs, Monte Carlo method.

A detailed description is given of the analytical methods used in constructing the Monte Carlo model and code. The various mechanisms contributing to the energy losses of heavy particles moving through the atmosphere are reviewed, and it is concluded that for the cases of interest here only the elastic collisions need to be taken into account. An outline is given of a statistical treatment of inelastic collisions together with a derivation of the corresponding probability distribution. The probability distribution for the beta decays of fission particles is also derived, and the logical construction of the code for the calculation of a history of a given particle is described in detail. (Author)

AD-406 105 Div. 20, 7
(TISTP/TCG) OTS price $4.60

Air Force Special Weapons Center, Kirtland Air Force Base, N. M.
HIGH-TEMPERATURE DESTRUCTIVE TESTING OF PLUTONIUM-FUELED CAPSULES FOR A THERMOELECTRIC CONVERTER,
by John C. Clifford. May 63, 43p.
Proj. 1831
AFSWC TDR62 121
Unclassified report

Descriptors: *Energy conversion, *Radioactive decay, *Plutonium, *Shaped charges, Tantalum, Radiation damage, Thermal radiation, Radioactive isotopes, Radiography, Metallography, Test methods, High-temperature research, Oxidation, Nuclear power plants, Satellites (Artificial), Thermoelectricity, Energy, Fuels, Vulnerability.

Plutonium fuel capsules, designed for use in a thermoelectric SNAP device, were exposed to high-temperature oxidizing environments to evaluate the effects on capsule integrity and to determine the quantity and characteristics of alpha activity released during destruction of capsules. For test purposes plutonium-239 was substituted for the normal plutonium-238 fuel charge. Capsules which survived the tests were examined by radiographic and metallographic techniques to determine the degree of damage sustained. Residues from destroyed capsules and filter papers from a 90 degree segment, 800-meter air-sampling network were analyzed radiochemically to determine the quantities and characteristics of the released alpha activity. Because of the confined test configuration, massive alloying of plutonium and capsule components were observed when capsules were destroyed. As a result the fraction of plutonium which escaped to the atmosphere was small, on the order of 10 to the -4th power of the initial charge. From cascade impactor samples of the airborne debris it was estimated that 90% of the alpha activity was associated with material of 1.5 micron median diameter or less. (Author)

AD-406 123 Div. 20
(TISTP/FEM) OTS price $8.10

Air Force Special Weapons Center, Kirtland Air Force Base, N. Mex.
SNAP 2/10A GROUND TEST PROGRAM, PHASE I,
by John D. Belson. Mar 63, 79p.
Proj. 1831, Task 071
AFSWC TDR62 144 Unclassified report

Descriptors: *Nuclear reactors, *Test facilities, *Shock waves, Costs, Nuclear energy, Thermoelectricity, Energy conversion, Satellites (Artificial), Ground support equipment, Flight testing, Simulation, Instrumentation, Test equipment, Safety, Vulnerability, Tests, Nuclear power plants, Impact shock.

Tests of the SNAP 2/10A Reactor Ground Test Program to determine the structural behavior of the SNAP 2/10A reactor assemblies when subjected to thermochemical, fire, explosive and impact environments are discussed. (Author)

AD-406 462 Div. 20, 25
(TISTP/GRW) OTS price $1.60

RAND Corp., Santa Monica, Calif.
AIR CONDUCTIVITY PRODUCED BY NUCLEAR EXPLOSIONS,
by W. J. Karzas and R. Latter. May 63, 16p.
M RM3671PR
Contract AF49 638 700
Unclassified report

Descriptors: *Nuclear explosions, *Air, Electrons, Partial differential equations, Ions, Electron transitions, Electrical conductance, Secondary emission, Integration, Electromagnetic fields, Electron density.

In order to determine the electromagnetic field generated by nuclear explosions in the atmosphere, it is essential to specify the explosion-induced conductivity of the air in the neighborhood of the burst point. It is known that this conductivity depends upon the spectrum of the ionized electrons through the dependence of the conductivity on the energy-dependent electron-atom collision frequency. The spectrum of the ionized electrons is determined in terms of their source function. With this spectrum, the electron collision frequency, and hence the electronic conductivity per ionized electron, is estimated. (Author)

AD-406 758 Div. 20
(TISTP/TL) OTS price $7.60

Stanford Research Inst., Menlo Park, Calif.
RADIATIVE ENERGY TRANSFER FROM NUCLEAR DETONATIONS ABOVE 50-KM ALTITUDE,
by R. I. Miller and T. O. Passell. 30 Apr 63, 60p.
Contract OCD OS62 135, Proj. IMU4021 302
Unclassified report

Descriptors: *Nuclear explosions, *Thermal radiation, Absorption, Blackbody radiation, Atmosphere, X-ray spectrum, Fluorescence, Heat transfer, High altitudes.

The thermal energy flux expected at optimally oriented surfaces at the earth's surface from nuclear bursts detonated above 50 kilometers altitude was computed from basic physical principles. The cheif principles involved are: (a) absorption by the earth's atmosphere of a blackbody X-ray spectrum from a point source near 107 K; (b) heating of air to some temperature depending upon its known internal energy-temperature function; (c) radiative cooling of the heated air assuming thermal equilibrium; (d) disposition of the radiant emission into three energy bands; cold oxygen absorption band, ozone absorption band, and the atmospheric passband. (Author)

AD-406 773 Div. 20, 16
(TISTM/ODN) OTS price $1.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
EXPERIMENTAL CALIBRATION OF SEMICONDUCTOR DETECTOR PULSE-HEIGHT RESPONSE TO PROTONS,
by George W. Crawford, Thomas A. Alexander, Hartmut A. W. Spetzler, Joseph S. Pizzuto, and James D. Hall. Mar 63, 8p.
Task 775701
SAM B TDR63 21 Unclassified report

Descriptors: *Detectors, *Semiconductors, *Radiation measurement systems, Proton beams, Energy, Protons, Semiconductor devices, Absorption, Measurement, Silicon, Pulse height analyzers, Calibration.

Significant progress has been made toward accomplishing measurement of the energy absorbed from a proton as a function of the path length of the proton in the sensitive volume of a semiconductor detector. Surface barrier P-N and P-i-N detectors were used in the study utilizing path lengths as short as 100 microns and as long as 10 cm. Protons of initial energy of 16, 40, and 187 mev were used. Other proton energies (8 to 166 mev) were obtained by using absorbers in the proton beam. Energy calibrations were accomplished by total absorption of protons of known energy. (Author)

AD-406 777 Div. 20, 2
(TISTP/TCG) OTS price $6.60

Stanford Research Inst., Menlo Park, Calif.
TRANSMISSION BY THE EARTH'S ATMOSPHERE OF THERMAL ENERGY FROM NUCLEAR DETONATIONS ABOVE 50-KM ALTITUDE,
by Thomas O. Passell. 30 Apr 63, 56p.
Contract OCD OS62 135, Proj. IMU 4021 302, Task 3
Unclassified report

Descriptors: *Earth, *Atmosphere, *Nuclear explosions, Clouds, Atmospheric refraction, Meteorological parameter, Wave transmission, Nuclear energy, High altitude, Thermal radiation, Attenuation.

The extensive literature on transmission of solar energy by the earth's atmosphere supports transmission estimates for the average clear day at sea level ranging from around 80% for vertical rays to around 15% for rays 5 degrees above horizontal. Cloud transmission (on the basis of 100% for a clear day) varies from around 30% for light cloud to around 3% for a dense cloud. Transmission factors can be computed when the more important atmospheric parameters are known, namely, (1) thickness, liquid content, and droplet size of clouds; (2) size and volume concentration of solid haze particles; (3) reflectivity of the earth's surface. Theoretically estimated upper limits to the unattenuated energy flux from a 1000-mt detonation (taken from a companion study to the present one), combined with the above estimates of atmospheric transmission give ignition radii ranging from 250 km at 50-km burst height to 0 km at 240-km burst height for the average clear day at sea level. An attempt has been made to give upper limits to both transmission factors and energy fluxes. (Author)

21. NUCLEAR PROPULSION

No Entries

22. ORDNANCE

AD-406 087 Div. 22, 12
(TISTM/AAR) OTS price $1.60

Picatinny Arsenal, Dover, N. J.
ESTABLISHMENT OF SAFETY DESIGN CRITERIA FOR HIGH ENERGY PROPELLANT MANUFACTURING AND STORAGE FACILITIES,
by Leon W. Saffian. Jan 63, 16p.
PA TM1065
Unclassified report

Descriptors: *Propellants, *Explosive materials, Manufacturing methods, Detonations, TNT, Design, Safety, Storage.

The data and discussion presented are based on controlled explosions where studies of the effects of blast and fragments on initiation of acceptor charges are made. The effect of blast on sympathetic detonation is discussed in terms of peak pressure developed by detonation of donor explosive and sensitivity of the acceptor charge. A method is discussed for predicting the vulnerability to high-order detonation of an explosive (or high-energy propellant) system by fragment impact in terms of geometry of the system and explosive properties. (Author)

AD-406 203 Div. 22
(TISTM/PCR) OTS price $1.60

Springfield Armory, Mass.
BIBLIOGRAPHY OF SPRINGFIELD ARMORY TECHNICAL REPORTS AND NOTES ON MATERIEL - 1 JANUARY 1961 - 31 DECEMBER 1962.
31 Jan 63, 13p.
SA TR20 9102 Unclassified report

Descriptors: *Bibliographies, *Abstracts, Small arms, Automatic weapons, Gun mounts, Spotting rifles, Aluminum coatings, Steel, Chromium, Plating, Powder metals, Carbides, Machining, Ultrasonic radiation, Sintering, Non-destructive testing, Cartridges, Analog computers, Armament, Helicopters, Errors, Ordnance, Guns.

This bibliography is a compilation of Technical Reports and Notes on Materiel prepared and published by Springfield Armory Research and Engineering Division. This bibliography covers the period from 1 January 1961 to 31 December 1962. Abstracts of Technical Reports are included in this bibliography. (Author)

AD-406 244 Div. 22, 25
(TISTM/PCR) OTS price $1.10

Aerospace Information Div., Washington, D. C.
EXPLODING WIRES, FILMS, AND RIBBONS. ANNOTATED BIBLIOGRAPHY.
3 June 63, 8p.
AID B63 78 Unclassified report

Descriptors: *Exploding wires, *Bibliographies, Films, Abstracts, Scientific personnel, Photographic equipment, Spectra (Visible and ultraviolet), Kerr cells, Ferrite, Sparks, Circuits, Hydrodynamics, Theory, Electron optics, Electrical impedance, Thickness, Temperature, Light pulses, Gases, Oscillographs, Electrons, Plasma physics.

This bibliography is intended as a guide to Soviet literature on electrically exploded conductors. It was compiled from six Soviet journals, spanning the period March 1957 to January 1963. The eleven entries are arranged alphabetically by author. An annotation is provided for each article. (Author)

AD-406 246 Div. 22, 15
(TISTP/RLG) OTS price $10.50

Military Physics Research Lab., U. of Texas, Austin.
SCORING METHODS STUDY. APPENDICES.
Final rept.
Mar 63, 128p.
Contract AF08 635 2631, AFSC Proj. 7844
ASD TDR63 17, vol. 2 Unclassified report

Descriptors: *Trajectories, *Firing error indicators, Synthesis, Motion, Equations, Data, Analysis of variance, Measurement, Least squares method, Tracking, Reliability, Numerical analysis, Determination, Special functions, Polynomials, Analysis.

This second volume of the final report on the Scoring Methods Study contains the appendices which support elements of the discussion presented in Volume I. These appendices, except Appendix 2, were originally issued separately as attachments to the monthly progress reports. They have been extensively revised and new material has been added. They are as follows: (1) Appendix 1 - Trajectory Analysis and Synthesis; (2) Appendix 2 - Effects of Own-Ship Angular Motion on Relative Trajectories; (3) Appendix 3 - Rate Characteristics of Linear Relative Trajectories; (4) Appendix 4 - Minimum Data Requirements and Variance Considerations for One-, Two-, and Three-Station Measurements; (5) Appendix 5 - Least-Squares Adjustment of Two-Station Angle-Only Position Fixes with Reliabilities of Adjusted Data; and (6) Appendix 6 - Application of Polynomial-Based Smoothing and Interpolating Formulas to Scoring Problems. (Author)

AD-406 282 Div. 22
(TISTP/JEA) OTS price $4.60

Bureau of Mines, Pittsburgh, Pa.
HYPERVELOCITY IMPACT PHENOMENA.
Quarterly rept. 1 Mar-31 May 63,
by Richard W. Watson, Karl R. Becker, J. Edmund Hay and Frank C. Gibson. 6 June 63, 40p.
Unclassified report

Descriptors: *Hypervelocity projectiles, *Penetration, Distillation, Spallation, Target angle, Velocity, Mathematical models, Statistical data, Aluminum.

A summation of the research performed at the Explosives Research Laboratory, Pittsburgh, Pa. in the field of hypervelocity impact on thin targets is presented. The immediate goal of the research is to obtain a complete description of the thin-plate perforation process within the limits of available explosive projectors. The bulk of the work to date has been carried out with 2024-T3 aluminum as the target material; however, other higher density target materials were used when required for clarification of impact pressure effects. Four basic categories characterize the results of target impact: primary target damage, the number distribution of spall particles, the mass distribution of spall and the velocity of the ejecta fromed during the perforation process. (Author)

AD-406 306 Div. 22
(TISTP/WH) OTS price $2.40

Naval Radiological Defense Lab., San Francisco, Calif.
USE OF La(140) AS RADIOTRACER IN (PRE-BUGGY) CHEMICAL EXPLOSIONS: PREPARATION AND DETER-

MINATION OF ITS REACTION WITH ENVIRONMENTAL MATERIALS,
by W. B. Lane, M. J. Nuckolls, and R. M. Railey. 4 Apr 63, 27p.
NRDL TR638 Unclassified report

Descriptors: *Lanthanum, *Tracer studies, *Nuclear explosions, *Cratering, Radioactive isotopes, Underground explosions, Simulation.

The pre-Buggy experiment was designed to measure the fraction of vented radioactivity from a series of HE underground detonations containing radioactive sources. Capsules (29) containing curie amounts of La(140) were prepared. The level of gamma activity in each capsule was sufficient to provide a radiotracing of the debris which resulted from the detonation. In addition NRDL furnished 'always open' fallout collectors to sample the debris, and a low-geometry scintillation counter to measure its La(140) content. Particle size measurements of the debris indicated that La(140) was adsorbed on the surface of the soil particles. Some 96% of the activity was associated with sub-sieve particles representing only 8% of the mass and 90% of the available surface area. (Author)

AD-406 307 Div. 22, 26, 9, 14
(TISTE/JBM) OTS price $8.60

Frankford Arsenal, Philadelphia, Pa.
DETERMINATION OF THE MECHANISMS GOVERNING THE INFLOW OF MOISTURE PAST A ROTARY SEAL - THEORETICAL MODEL,
by Bernard Hoffman. Jan 63, 89p.
Proj. 513 01 008
FA TM M63 1 1 Unclassified report

Descriptors: *Fire control system components, *Seals (Stoppers), *Moisture, *Water vapor, *Rotary seals, Design, Equations, Rubber gaskets, Injection, Instrumentation, Configuration, Diffusion, Transport properties, Temperature, Pressure, Humidity, Differential equations, Integral equations, Moistureproofing.

Efforts were made to determine a method for achieving an effective moisture barrier for fire control instruments. A description is presented of the probable mechanisms governing the inflow of water and its vapor through rotary seals. The mechanisms were determined from: (1) a search of the technical literature pertaining to the mass transfer of water, its vapor and related phenomena; (2) consultations with investigators who are active in the fields of science related to water vapor and water vapor phenomena; and (3) previously developed intuitive and statistical reasoning. Utilizing the drived mechanisms, calculations are made to obtain engineering estimates of probable leakages through actual rotary sealing systems (systems employing rotary 'O'-rings). A design of experiment is proposed for proving out the mechanisms. (Author)

AD-406 308 Div. 22, 26, 25
(TISTP/MFA) OTS price $4.60

Frankford Arsenal, Philadelphia, Pa.
DETERMINATION OF THE MECHANISMS GOVERNING THE INFLOW OF MOISTURE PAST A ROTARY SEAL.
Status rept.,
by Bernard Hoffman. Jan 63, 45p.
Proj. 513 01 008
FA M63 1 2 Unclassified report

Descriptors: *Test facilities, *Rotary seals, Fire control systems, Moisture, Fluid flow, Diffusion, Viscosity, Costs, Design, Tests.

The design of an experiment to verify the mechanisms governing the transport of moisture past a rotary seal is described. The mechanisms were determined after extensive search of technical literature and consultations with persons knowledgeable in the field of water vapor and related phenomena. Nonexistence of suitable testing facilities required the design and development of special equipments necessary to conduct the experiment. These equipments included special moisture sensors with associated indicating device and suitable sensor calibration means; leakproof chambers for simulating fire control instruments; means for simulating various modes of rotation; and a constant temperature environmental chamber. The testing facilities and their state of completion at the end of FY 1962 are discussed. Recommendations to continue the program are made; cost and time estimates for completion of testing facilities and carrying out of experiment are presented. (Author)

AD-406 324 Div. 22, 26
(TISTM/ODN) OTS price $2.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
DEVELOPMENT OF BROAD-BAND ELECTROMAGNETIC ABSORBERS FOR ELECTRO-EXPLOSIVE DEVICES.
Monthly progress rept. no. 9, 1 Mar-31 Mar 63,
by Paul F. Mohrbach and Robert F. Wood.
31 Mar 63, 20p. P B1981 9
Contract N178 8087
Unclassified report

Descriptors: *Explosives initiators, *Electromagnetic waves, High-temperature research, Broadband, Electrodeposition, Silver, Metal coatings, Coaxial cables, Ferrites, Wire, Tantalum, Radiofrequency, Resistance (Electrical), Iron, Materials, Dielectric films, Electromagnetic properties, Attenuation.

Data are presented on various techniques of electrodepositing silver coatings. Attenuation data are given for the special K-24 ferrite toroid. When silverplated it had a resistance of 0.38 ohm. Attenuation vaules at 1 Mc and 200 Mc were 36 db/cm and 150 db/cm respectively. Ferrites of suitable loss characteristics were produced by slow cooling in an inert atmosphere. It was necessary to enclose the furnace to maintain the desired environment. Difficulty was encountered with the ferrites fuzing to the zirconia substrate. Preliminary tests indicated that aluminum oxide or platinum may be satisfactory. An unexplained separation of some component of the ferrite was encountered during one firing run. This phenomenon has not yet been fully studied. Lossy insulated iron powders were used to insulate ferrite attenuators by a number of methods. The attenuation from the iron insulation did not compensate for the loss in attenuation due to the decrease in conductivity. Ferrite coatings were fired onto platinum, tantalum, tungsten, and molybdenum conductors in nitrogen at 1400 C for two hours. Only the platinum survived this treatment.

AD-406 346 Div. 22, 25
(TISTM/RGR) OTS price $4.60

Aerojet-General Corp., Downey, Calif.
PULSE-SENSITIVE ELECTROEXPLOSIVE DEVICES.
Summary rept., Phase 1, on The Feasibility Study and Process Development,
by H. M. Kenworthy. 7 June 63, 41p. 06989 01 10 FP
Contract N1788107
Unclassified report

Descriptors: *Explosives initators, *Metal films, *Electric bridges, *Electric detonators, Beryllium compounds, Oxides, Gold, Electromagnetic pulses, Heat, Sensitivity, Design, Heat transfer, Temperature, Design.

A system consisting of lead azide, gold film, BeO header, and heat sink has been shown to withstand 10 amp or 10 w of continuous power while being capable of initiation with a pulse from a charged 1 microfarad capacitor. The gold-film-bridged BeO substrate units are truly pulse sensitive. It is also significant that the gold-film-bridged glass system is pulse sensitive and fires with approximately one-ninth the energy required for a corresponding conventional wire-bridged glass system. The advantages of a film-bridged BeO system were strikingly demonstrated with respect to its capability to dissipate power while still retaining its pulse-firing capability. (Author)

AD-406 790 Div. 22, 31, 12
(TISTP/JEA) OTS price $12.00

American Bosch Arma Corp., Garden City, N. Y.
TERNE.
Final rept.
30 Apr 63, 1v. DG E531 323
Contract N140 122 69961
Unclassified report

Descriptors: *Antisubmarine ammunition, *Depth charges, Shipborne, Specifications, Effectiveness, Installation, Ships, Checkout procedures, Documentation, Fire control systems, Statistical data, Sonar, Underwater rockets, Surface to underwater, Rocket assisted projectors.

The system integration effort performed by the Arma Division, American Bosch Arma Corporation in furnishing technical assistance to U. S. Naval Underwater Ordnance Station to provide the DE1035 and DE1036 with ASW Weapon System MK 1 Mod 0. This system combines the Norwegian TERNE ASW System with U. S. Fire Control System MK 105. This report is a summary of the services and equipment furnished. (Author)

23. PERSONNEL AND TRAINING

AD-406 267 Div. 23, 30
(TISTM/WA) OTS price $7.60

University of Southern Calif., Los Angeles.
COMPUTER PERSONNEL SELECTION AND CRITERION DEVELOPMENT: I. THE RESEARCH PLANS,
by Joseph W. Rigney, Raymond M. Berger, and Arthur Gershon. Feb 63, 66p. TR36
Contract Nonr228 22, Proj. NR153 093
Unclassified report

Descriptors: *Personnel management, *Computers, Programming, Job analysis, Performance tests, Models, Scientific research, Psychometrics, Training.

There are three main sections in this report. The first section is concerned with the basic concepts of personnel selection, the design of a prediction model, and the implications of the prediction model for research planning. The second deals with the special characteristics of the computer field as they affect task description, performance evaluation and selection procedures. The third section presents the research plans in three operational phases. Phase I involves task description and the identification of job types. Phase II involves the bridging operations for proceeding from job requirements to criterion measures. Phase III concerns the development of predictors, and the validation of the predictors against the criterion measures. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

No Entries

25. PHYSICS

AD-405 919 Div. 25, 8
(TISTE/CAM) OTS price $2.00

Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
RANDOM VIBRATION STUDIES OF COUPLED STRUCTURES IN ELECTRONIC EQUIPMENTS.
Rept., 15 May-15 Nov 62,
by Richard H. Lyon, Gideon Maidanik, Ewald Eichler, and James J. Coles. Apr 63, 72p.
Contract AF33 657 9118, Proj. 1309, Task 130904
ASD TDR63 205 Unclassified report

Descriptors: *Coupling circuits, *Electronic equipment, *Packaged circuits, Radiofrequency power, Cantilever beams, Flat plate models, Theory, Experimental data, Test equipment, Vibrators (Mechanical), Panels (Structural), Structural parts, Vibration, Acoustic impedance.

The research has centered on two main categories; the replacement of acoustic excitation by direct mechanical excitation of structures and the response of substructures which are tied to a randomly vibrating primary structure. Studies are included on the power transferred to a plate by a shaker, the variation in vibratory response at various positions and frequency bands, and the energy sharing between randomly excited structures which have mechanical connections. Plans for further research are also included. (Author)

AD-405 927 Div. 25, 22
(TISTP/MH) OTS price $14.00

Microwave Lab., Stanford U., Calif.
ELECTROMAGNETIC SHOCK WAVES IN GYROMAGNETIC MEDIA,
by W. B. Hatfield, Jr. Apr 63, 194p. 1020
Contract DA36 039AMC00041, Proj. 3A99 21 001
Unclassified report

Descriptors: *Shock waves, Electromagnetic waves, Propagation, Wave transmission, Direct current, Electric fields, Ferrites, Ferromagnetic materials, Ferromagnetism, Low frequency, Electromagnetic pulses, Microwave equipment, Magneto optic effect.

The purpose of this study was to investigate the propagation of finite amplitude electromagnetic waves in gyromagentic media, with particular emphasis upon the formation and propagation of electromagnetic shock waves. After discussing qualitatively the nature of finite amplitude wave propagation in gyromagentic and other media, it is demonstrated that, for a finite amplitude electromagnetic wave propagating parallel to the external dc field in a semi-infinite ferrite medium, sufficient distortion of the wave fronts to lead to electromagnetic shock wave formation can occur only in waves whose characteristic frequency is far below the resonant frequency of the medium. The propagation of electromagnetic waves in the low frequency, or quasi-static, approximation was investigated using the method of characteristics. By using this method, it is possible to demonstrate the formation of electromagnetic shock fronts in waves propagating parallel to the external field and to study their growth, propagation, and eventual decay. Finally, the possibility of actually generating electromagnetic shock waves is discussed, as well as their possible application in large amplitude pulse sharpening networks and microwave devices. (Author)

AD-405 928 Div. 25, 8
(TISTP/MH) OTS price $3.60

Brown U., Providence, R. I.
INVESTIGATIONS OF SURFACE PROPERTIES OF SILICON AND OTHER SEMICONDUCTORS.
Final rept., (Supplement), 30 Sep 62-31 Jan 63. Feb 63, 15p.
Contract AF19 604 5986, Proj. 5620, Task 56206
AFCRL 62 949 S Unclassified report

Descriptors: *Semiconductors, Silicon, Work functions, Niobium, Ion bombardment, Germanium, Ionization potentials, Adsorption, Surface properties.

The photoelectric work functions of atomically clean surfaces of three planes of niobium as measured by the Fowler method are; (111), 4.66; (335), 4.55; (110), 4.33 ev. The work function of ion bombarded surfaces of all three planes is 4.09 ev. The sticking coefficient for oxygen on the clean surfaces is 0.9 and on the ion bombarded surfaces is 0.2. The sticking coefficient for carbon monoxide on these surfaces was found to be at least an order of magnitude lower than the values quoted for oxygen. The work function of ion bombarded surfaces is found to be dependent on the extent of bombardment for bombardments of less than one minute carried out at 0.20 ma/square centimeter . A work function of about 4.7 ev has been observed for a bombardment of 20 seconds on the (355) face. Ion-bombardment etching effects observed on the three planes are similar to those observed on germanium and silicon. (Author)

AD-405 937 Div. 25, 9
(TISTP/MH) OTS price $7.60

Aerospace Corp., Los Angeles, Calif.
NONEQUILIBRIUM ELECTRON TEMPERATURE EFFECTS IN WEAKLY IONIZED STAGNATION BOUNDARY LAYERS,
by Paul M. Chung and James F. Mullen. 20 May 63, 72p. TDR169 3230 12TN7
Contract AF04 695 169
SSD TDR63 109
Unclassified report

Descriptors: *Boundary layer, Electrons, Temperature, Plasma physics, Electric potential, Stagnation point, Ionic current, Density, Energy, Electrical conductance, Equations, Plasma sheath.

An electron energy equation is formulated for weakly ionized stagnation boundary layers (degree of ionization in the order of 0.1% or less) over highly cooled surfaces. Only the cases of moderately negative wall potential with respect to the plasma, where the ratio of the electron to ion current densities is between about 1/10 to 10, are considered. The equation is simplified by taking advantage of the fact that the electron energy equation is rather insensitive to the detailed variation of the electron concentration profile. A solution of the simplified electron energy equation is obtained analytically for the cases where the electron temperatures are not in equilibrium with the neutral gas temperatures. The effects of nonequilibrium electron temperatures on the electrical characteristics of the boundary layer are then analyzed. (Author)

AD-405 947 Div. 25, 14, 4
(TISTP/MH) OTS price $8.10

New York U., Coll. of Engineering, N. Y.
RESEARCH ON THE PREPARATION OF PURE METALS.

Final rept.,
by Walter Brenner and Charles J. Marsel.
15 Mar 63, 79p.
Contract AF19 604 4124, Proj. 5620, Task 56204
AFCRL 63 97 Unclassified report

Descriptors: *Metals, Experimental data, Semiconductors, Gallium, Gallium compounds, Lithium compounds, Barium, Lithium, Yttrium, Yttrium compounds, Resistance, Preparation.

This report summarizes the experimental studies which were carried out under Contract AF 19(604)-4124 subsequent to the work described in Scientific Report 4. The various investigations are described under two main headings reflecting the main subject matters, i.e. research on the preparation of pure metals and research on organic semiconductors. Some of the material included has previously been published in the form of scientific papers originally presented at various scientific meetings during the reporting period. All such material has been suitably identified. Also particular care has been taken to include the data of the latest experiments even though in certain cases no duplicate runs could be made to confirm the initially obtained results. (Author)

AD-406 092 Div. 25
(TISTP/WH) OTS price $5.60

Tracor, Inc., Austin, Tex.
AN ANALYTIC SOLUTION TO THE SOUND PRESSURE FIELD RESULTING FROM A PLANE WAVE INCIDENT ON A CYLINDER AND CONCENTRIC CYLINDRICAL SECTION - COMPUTATIONAL TECHNIQUES.
Technical memo.,
by G. S. Mills, W. C. Moyer, and Alice M. Spitzer.
8 May 63, 1v. 63 145U
Contract NObsr89265, Proj. SF001 03 01, Task 8100
Unclassified report

Descriptors: *Sound, *Programming (Computers), Reflection, Cylindrical bodies, Bessel functions, Simultaneous equations, Transducers (Acoustic), Pressure, Mathematical analysis.

The computational techniques are described which are used in the numerical evaluation of a solution to the sound pressure field resulting from a plane wave incident on a cylinder and concentric cylindrical section. (Author)

AD-406 140 Div. 25
(TISTM/EJH) OTS price $2.60

Courant Inst. of Mathematical Sciences, New York U., N. Y.
THE FIELD OF A DIPOLE ABOVE AN INFINITE CORRUGATED PLANE,
by T. S. Chu and S. N. Karp. Feb 63, 15p. EM181
Contract AF19 604 5238, Proj. 5635, Task 56350
AFCRL 62 928 Unclassified report

Descriptors: *Electromagnetic fields, *Magnetic moments, *Dipole moments, Mechanical waves, Ships, Water waves, Surfaces, Integral equations, Propagation, Excitation.

Excitation and propagation of the three dimensional electromagnetic field over an infinite corrugated plane which is approximated by an anisotropic impedance boundary condition is discussed. Emphasis is placed upon effects of surface anisotropy which are not evident in two dimensional treatments. The excitation by a magnetic point dipole is considered in detail. The fields are determined by a scalar wave function which satisfies a mixed boundary condition involving a linear combination of the wave function, its normal derivative and its second order tangential derivative. The exact formal solution is first derived, and then the radiated far field and the surface wave far field are evaluated separately. Both the phase and the amplitude of the excited surface wave are dependent upon the direction of observation. Numerical results are given. The physical significance of this solution is discussed. A comparison is made between this problem and the theory of ship waves. (Author)

AD-406 154 Div. 25, 9
(TISTP/FEM) OTS price $1.60

Watertown Arsenal Labs., Mass.
A METHOD OF SUCCESSIVE APPROXIMATION APPLIED TO A CLASS OF SHELLS OF REVOLUTION WITH REGIONS OF RAPIDLY VARYING THICKNESS,
by Oscar L. Bowie. Mar 63, 16p.
DA Proj. 1A0 10501B010
WAL TR893 3 4 Unclassified report

Descriptors: *Cylindrical bodies, Boundary layer problems, Load distribution, Loading (Mechanics), Stresses, Thickness, Numerical analysis, Axially symmetric flow, Partial differential equations, Complex variables, Functions, Elasticity.

A plan of successive approximations is outlined for handling the equations of the three-dimensional problem in elasticity for shells of revolution with regions of rapidly varying thickness along the conceptual lines of a technique proposed by O. Gohner. Attention is confined to essentially cylindrical shells with regions of rapidly varying thickness, e.g., circumferential notches or grooves. For a restricted but useful class of loadings, plane biharmonic stress functions can be utilized. The first two orders of theory are explicitly formulated in the framework of analytic functions of a complex variable. (Author)

AD-406 175 Div. 25
(TISTP/MH) OTS price $8.10

Carnegie Inst. of Tech., Pittsburgh, Pa.
SPHERICAL NUCLEI WITH SIMPLE RESIDUAL FORCES,
by Leonard S. Kisslinger and Raymond A. Sorensen.
16 Apr 63, 94p. TR11
Contract Nonr76015, Proj. NR012 202
Unclassified report

Descriptors: *Nuclei, Functions, Even-even nuclei, Odd-odd nuclei, Odd-even nuclei, Dipole moments, Electric moments, Quadrupole moments, Nuclear particles, Phonons, Isotopes, Beta particles, Theory.

AD-406 190 Div. 25
(TISTP/MH) OTS price $9.10

Oklahoma U. Research Inst., Norman.
GRAIN BOUNDARY DIFFUSION IN LEAD.
by J. P. Stark and W. R. Upthegrove. 31 May 63, 97p.
Contract Nonr98204, Proj. NR031 611
Unclassified report

Descriptors: *Grain structures, Lead, Tin, Thallium, Indium, Bismuth, Impurities, Crystal structure, Crystals, Experimental data, Autoradiography, Models, Penetration, Diffusion.

The purpose of this research was to investigate grain boundary self-diffusion in high purity lead and, specifically, to study the influence

of orientation and impurity content upon this phenomena. Bicrystals of zone-refined lead were grown from the melt with various tilt and twist grain boundary orientations to study the effect of misfit. For the study of impurity effects, bicrystals with similar misfit were grown with lead containing varying amounts of the impurities tin, thallium, indium, and bismuth. Diffusion experiments were carried out using high resolution autoradiography and lead-210. Diffusion coefficients were determined from the Whipple and Fisher diffusion models with the data of depth of penetration measurements. (Author)

AD-406 194 Div. 25, 30, 8
(TISTE/CAM) OTS price $3.60

Space Sciences Lab., U. of Calif., Berkeley.
RADIOMETER STUDIES AND RELATED PROBLEMS.
Technical rept.
1 Apr 63, 1v. 54; I22
Contract Nonr22254
Unclassified report

Descriptors: *Radiometers, Microwave networks, Intermediate frequency amplifiers, Calibration, Operation, Parabolic antennas, Gain, Measurement, Theory, Signal-to-noise ratio, Noise (Radio).

AD-406 214 Div. 25, 8
(TISTP/AMS) OTS price $7.60

Colorado U., Boulder.
SURFACE IONIZATION OF LITHIUM FLUORIDE AND THALLIUM ON TUNGSTEN, RHENIUM, AND PLATINUM SURFACES.
Special technical progress rept. no. 1,
by Svein G. Andresen. Mar 63, 67p.
Contract DA36 039sc87277, Proj. 3A99 15 001
Unclassified report

Report on Millimeter Wave Transitions for Frequency Control.

Descriptors: *Ionization, *Surface properties, *Thallium, *Lithium compounds, *Fluorides, *Lithium, Tungsten, Rhenium, Platinum, Molecular beams, Low pressure research, Vapor pressure, Molecular properties, Signal to noise ratio, Fluorine, Theory, Work function, Experimental data, Mathematical analysis, Mathematical models, Test methods, Equations, Standards, Frequency, Surface temperature, Temperature, Filaments.

Ionization efficiencies of lithium, lithium fluoride, and thallium on hot tungsten, rhenium and platinum surfaces were studied using molecular beam techniques. The temperature dependence of the efficiencies as well as aging effects of the filaments used were determined. Careful design of the apparatus allowed pressures of the order of 5 x 10 to the -9th power mm Hg to be maintained at the detector contributing to the degree of cleanliness of the hot surfaces. As a by-product of the efficiency measurements, vapor pressure data, and estimated molecular scattering cross sections for LiF, Li, Tl were obtained. Signal-to-noise ratios were estimated from the recordings made. (Author)

AD-406 222 Div. 25, 2
(TISTP/JW) OTS price $2.60

Ballistic Research Labs., Aberdeen Proving Ground Md.
FARADAY ROTATION NEAR THE TRANSVERSE REGION OF THE IONOSPHERE,
by George A. Dulk. Apr 63, 32p.
Proj. 1A011001B021
BRL 1200 Unclassified report

Descriptors: *Magneto-optic effect, Ionosphere Magnetic fields, Equations, Rotation.

Some of the equations usually used to describe Faraday rotation are incorrect for the case of propagation through an anisotropic magnetic field when the cosine of the angle between the magnetic field and the wave normal changes sign along the ray path. Such a case is common when transmissions are from a high altitude satellite in the region of the ionosphere where the direction of propagation is nearly perpendicular to the earth's magnetic field. Use of the uncorrected equations can result in misinterpretation of the data. The corrected equations are given and are shown to be consistent with measured Faraday rotation. With the corrected equations used in a ray-tracing program, an analysis is made of errors resulting from the use of several approximations near the transverse region. The approximations investigated are: (1) quasi-longitudinal propagation, (2) straight-line propagation, and (3) use of an effective ionospheric height. (Author)

AD-406 229 Div. 25
(TISTP/MFA) OTS price $4.60

General Electric Co., Schenectady, N. Y.
PERFORMANCE CHARACTERISTICS AND EMISSION COOLING MEASUREMENTS TAKEN ON A Cs VAPOR THERMIONIC CONVERTER WITH A THORIUM-TUNGSTEN EMITTER,
by J. M. Houston. May 63, 36p. SR1
Contract AF19 604 8424, Proj. 8659, Task 865902
AFCRL 63 450 Unclassified report

Descriptors: *Thermionic converters, *Cooling, Thermionic emission, Plasma physics, Resonance, Resistance (Electrical), Heat shields, Tungsten, Tantalum, Calibration, Thorium, Thermal radiation, Vapors, Electrons, Temperature, Cesium, Measurement.

Measurements were made on a cylindrical, indirectly heated Cs-vapor thermionic converter having a stainless steel collector spaced 1 mm from a 13.3 sq. cm Th-W emitter. At an emitter temperature of 2100 K, a power output of 4.4 watts/sq. cm (at 1.3 volts) at a measured overall efficiency of 8.5% was observed. At 2200 K, a power output of 8.8 watts sq. cm at 11.9% efficiency was observed. Measurements of the cooling of the emitter due to electron emission indicate that in the retarding range of the converter the emission cooling is just what simple theory would predict, the plasma electron temperature being equal to that of the emitter. However, for collector-to-emitter voltages more positive than approximately -1.3 volts, the emission cooling fell far below that predicted by simple electron emission from the emitter, indicating that a large amount of power (as much as 20 watts/sq. cm at positive collector voltages) was flowing from the plasma back to the emitter. This anomaly in the emission cooling is interpreted in terms of resonance radiation, excited atoms, and ions returning to the emitter. These originate in a region of high electron temperature adjacent to the emitter. (Author)

AD-406 249 Div. 25
(TISTP/FEM) OTS price $11.50

California U., Los Angeles.
A PERTURBATION THEORY OF THE HEISENBERG ANTI-FERROMAGNET,
by Donald L. Bullock. May 63, 140p. TR6
Contract Nonr23363, Proj. NR018 105
Unclassified report

Descriptors: *Antiferromagnetism, Magnetic properties, Spin, Operators (Mathematics), Equations, Matrix algebra, Partial differential equations, Magnetism, Excitation, Algebra, Perturbation theory.

The determination of some physical parameters of the ground state for the Heisenberg antiferromagnet is considered. The problem of more general lattices and of arbitrary spin is considered, and the long range order parameter is also treated. The results are reported in terms of series expansions generated by means of a modified Rayleigh-Schrodinger perturbation theory, which is proposed and developed in this dissertation. The modification amounts to a process whereby the definition of the zero-order Hamiltonian is changed through the prediction and inclusion of certain infinite classes of terms, whose first members appear in the original perturbation series. The final zero-order Hamiltonian obtained is the Ising model. Explicit expressions for the ground state parameters are given through fourth order for the liner chain, some quadratic, and simple cubic lattices with arbitrary spin. The calculation is carried through to determine the energy series through six orders also for the linear chain with spin one-half. A comparison with experimental determinations of the long range order in real antiferromagnets is made. (Author)

AD-406 296 Div. 25
(TISTP/TCG) OTS price $4.60

David Sarnoff Research Center, Princeton, N. J.
SUSCEPTIBILITY IN SEMICONDUCTORS.
Final rept., 1 Apr 61-31 Mar 63,
by A. R. Moore and J. O. Kessler. 31 Mar 63, 44p.
Contract Nonr346700
Unclassified report

Descriptors: *Semiconductors, *Plasma physics, *Crystals, Recombination reactions, Magnetic fields, Transport properties, Equations, Plasma oscillations, Germanium, Photoconductivity, Theory, Magnetic properties, Magnetic moments, Surface properties.

The magnetic moment M of a plasma consisting of holes and electrons generated by light within a cylindrical semiconductor crystal immersed in a magnetic field is discussed. Macroscopic transport equations are used to derive the dependence of M on field strength, mobility, and surface recombination conditions. In the limits of low and high surface recombination the theoretical result demonstrates the transition between transverse equilibrium (M = 0) and pure magnetic confinement. Experiments using Ge and an inhomogeneous magnetic field directly measured the diamagnetic force exerted by the plasma on its scattering medium. An induction method utilizing a uniform magnetic field of strength up to 70 kgauss gave collateral results. The dependence of the moment on magnetic field strength, light intensity, temperature, and surface recombination velocity support the theory. (Author)

AD-406 298 Div. 25, 8
(TISTP/WH) OTS price $1.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
THE REACTANCE OF A SYMMETRICAL PAIR OF STRIPS IN RECTANGULAR WAVEGUIDE,
by L. Lewin. 23 Apr 63, 10p. RR PIBMRI1158 63
Contract AF19 604 7499, Proj. 4600, Task 460004
AFCRL 63 125 Unclassified report

Descriptors: *Waveguides, Numerical analysis, Polarization, Electric fields, Integral equations, Electrical properties.

An integral equation is found for the currents on a pair of symmetrical inductive strips in a rectangular waveguide, and is solved by known techniques to the quasi-static approximation. The integrals involved in the formula for the reactance presented to the waveguide are expressed in terms of elliptic integrals, and by a comparison of the result with the known result for a single inductive strip, the mutual inductance between a pair of strips in a waveguide is deduced. (Author)

AD-406 313 Div. 25
(TISTP/MFA) OTS price $2.60

Westinghouse Electric Corp., Baltimore, Md.
DEVELOPMENT OF MILLIMETER AND SUBMILLIMETER MASER DEVICES.
Interim technical rept. no. 1, 1 Feb-31 May 63,
by W. E. Hughes. 31 May 63, 20p.
Contract AF33 657 10472, Task 415604
Unclassified report

Descriptors: *Masers, *Materials, *Titanates, Titanium compounds, Oxides, Zinc, Sulfates, Lanthanum, Relaxation time, Atomic energy levels, Cerium, Measurement, X band, Frequency, Tungstates, Millimeter waves, Tests, Iron.

The first reporting period was devoted to establishing possible maser pumping schemes and obtaining instrumentation for experiments at frequencies near 140 gc. Tests were made, using the iron ion in rutile as active material, to determine if maser action could be expected at the proper frequency. A sample of iron-doped zinc tungstate was obtained and tested; however, it does not appear to offer any significant advantage for millimeter maser development over iron-doped rutile. The IBM 7090 computer facility at Air Arm has been programmed to obtain transition probabilities for iron-doped rutile. These transition probabilities are necessary in order to understand more easily the operation of millimeter wave masers. To date, only the simple 3-level-type maser has been investigated, but analysis of the more complicated 5-level maser will be attempted. (Author)

AD-406 316 Div. 25
(TISTM/ODN) OTS price $4.60

Oklahoma State U., Research Foundation, Stillwater.
RELATION BETWEEN PHOTOCONDUCTIVITY AND CHEMISORPTION KINETICS FOR STANNIC OXIDE CRYSTALS.
Rept. for 1 May 62-15 Jan 63,
by J. E. Hurt and E. E. Kohnke. 15 Jan 63, 44p. TR2
Contract Nonr259501, Proj. NR015 222
Unclassified report

Descriptors: *Photoconductivity, *Adsorption, *Tin compounds, Crystals, Low pressure research, Cryogenics, Vacuum apparatus, Surfaces, Oxygen, Experimental data, Reaction kinetics, Oxides.

The photoconductive behavior of a number of natural and artificial crystalline specimens of stannic oxide was investigated in various gaseous ambients at pressures ranging from 10 to the 7th power mm Hg to atmospheric and at temperatures over the interval between 90 and 355 K. Dependence of photocurrent rise and decay rates on pressure and temperature was found to be consistent with the predictions of a model relating surface trapping of electrons and Elovich-type chemisorption. (Author)

AD-406 317 Div. 25
(TISTM/AAR) OTS price $2.60

Radiation Engineering Lab., Maynard, Mass.
MONTHLY ACCESSION LIST. COORDINATE INDEX, PART II FOR ACCESSION LISTS FROM JULY 1, 1962 TO APRIL 30, 1963.
15 May 63, 83p.

Unclassified report

Descriptors: *Radiation hazards, *Radiation effects, Materials, Documentation, Dose rate, Energy, Electromagnetic waves, Space environmental conditions, Indexes.

An inverted concept-coordinate index based upon terms generated in the REIC subject files is presented. The index is cumulative throughout the year, and the staff plans to provide a 'dual dictionary' at the end of each contract year to facilitate the retrospective search capabilities for the accession list abstracts. The index is subdivided into four sections. The first, Radiation Environment, includes dosimetry and energy aspects of all electromagnetic and particulate radiation sources, with the exception of space radiation. Section two deals with materials, properties, secondary environment (including space environments), devices, and all other subject concepts. Section three lists all authors, in alphabetical order; and section four lists the generating organization. (Author)

AD-406 343 Div. 25, 15
(TISTP/FEM) OTS price $2.30

Lockheed Aircraft Corp., Sunnyvale, Calif.
DIFFRACTION PATTERN ANALYSIS OF A RECTANGULAR APERTURE IN THE PRESENCE OF ABERRATIONS. PART 2. THE DIFFRACTION PATTERN IN THE PRESENCE OF SINGLE THIRD-ORDER ABERRATIONS. 1. THE EFFECT OF PRIMARY ASTIGMATISM,
by H. P. Greinel, May 63, 19p. 6 90 63 23

Unclassified report

Descriptors: *Diffraction, *Optical properties, Rotation, Mathematical analysis, Geometry, Bessel functions, Series, Integrals, Statistical distribution, Optical images, Analysis.

On the basis of the general solution of the diffraction integral for a rectangular aperture in the presence of geometrical-optical aberrations, the effect of primary astigmatism upon the diffraction pattern intensity distribution is discussed. The diffraction pattern of a stationary ectangular aperture is described by means of a conveniently chosen Cartesian reference system. Two orthogonal aperture orientations are considered and it is shown that the intensity distribution depends on the orientation of the aperture's symmetry axes with respect to the meridional plane defined by the optical axis and the geometrical image point. The intensity distributions in special cases of interest are indicated for each of the two aperture orientations. A general expression is derived for the diffraction-pattern intensity distribution in the rotating Cartesian reference coordinate system, and its mean value is obtained throughout half a slit revolution by integration. Special cases of interest are indicated. The over-all diffraction-pattern intensity distribution of the rotating aperture is determined with respect to a space-fixed coordinate system. The accumulated intensity at any arbitrary point of a space-fixed observation plane, as experienced by a photographic plate, may be obtained by integration. (Author)

AD-406 356 Div. 25
(TISTP/RLG) OTS price $8.60

Westinghouse Electric Corp., Pittsburgh, Pa.
THERMOELECTRICITY.
Quarterly progress rept. no. 3.
Oct 62, 1v.
Contract NObs86595

Unclassified report

Descriptors: *Thermoelectricity, *Thermocouples, *Pressure suits, *Thermal conductivity, *Materials, Cobalt alloys, Antimony alloys, Induction heating, Germanium alloys, Bismuth alloys, Tellurium alloys, Sintering, Microstructure, Protective clothing, Heaters, Cooling and ventilating equipment, Copper compounds, Sulfur compounds, Tellurium compounds, Tests, Alloys, Generators, Chemical compounds, Reliability.

The cobalt-antimony system is examined in an effort to develop a matching p and n material with thermoelectric properties. Measurements are being extended to higher temperature for the n material, and mechanical property measurements are being made. Material having p type thermoelectric properties over a broad temperature range has been made, but the properties are not optimum. Most of the contaminents, present as residuals in the raw materials, and those with which the alloy may come into contact during processing, such as O2 and H2, have been determined to be n type dopes. The p doping characteristics of Fe and Sn have been established. Thermal cycling tests have been run to provide further data on the effects of chemistry and processing on the thermal cracking of GeBiTe. Evaluation was made in terms of change in resistance and microstructure. (Author)

AD-406 371 Div. 25, 15
(TISTP/FEM) OTS price $2.60

Ecole Normale Superieure (France).
RELATIVISTIC DEUTERON WAVE FUNCTION - II,
by M. Gourdin and J. Tran Thanh Van. 1962, 20p. TN19
Contract AF61 052 173

Unclassified report

Descriptors: *Particles, *Nucleons, *Deuterons, *Deuteron cross sections, Theory, Matrix algebra, Momentum, Nuclear moments, Spin, Equations, Integral equations, Numerical analysis.

Research on the deuteron relativistic wave function is reported. Bethe and Salpeter's relativistic wave equation is applied to the bound system of two particles with spin 1/2. After some very slight approximations, the solution of the infinite system of coupled integral equations allows the explicit structure of the wave matrices corresponding to the S and D states to be found. The percentage of D state obtained is in good agreement with the experimental result. (Author)

AD-406 444 Div. 25, 8
(TISTP/JW) OTS price $2.60

Raytheon Co., Waltham, Mass.
HIGH FREQUENCY TUNNEL DEVICE STUDY,
by W. Feist. Apr 63, 21p. TN4
Contract AF30 602 2673, Proj. 4506, Task 450602
RADC TDR63 190 Unclassified report

Descriptors: *Microwave amplifiers, Cathodes, Emissivity, Thin films (Storage devices), Noise.

The work reported is aimed at investigating the feasibility of achieving low-noise microwave

amplification - specifically: 20 db gain, 6 db noise figure at 10 kmc, and 1 kmc bandwidth - by using tunneling. It was concluded that the most promising approach to achieving these objectives is through the use of a thin film cathode operating in conjunction with a microwave structure. At present, it is possible to build tunnel cathodes which exhibit sufficient current density to permit their use in a 10 kmc traveling-wave tube. However, the life of the cathodes under both dc and pulsed operation is by no means satisfactory. For this reason, efforts were directed towards obtaining better stability and life by improving the uniformity and dielectric strength of the thin insulating layer. To demonstrate the usefulness of tunnel cathodes in a traveling-wave tube, some prototype cathodes were built and incorporated in a suitable gun structure. The focused electron beam was imaged on a phosphor screen. The emission appeared to be uniform in this structure as well as in a projection tube image. Work was continued towards controlling the insulator thickness by ellipsometry. A tunnel cathode and a 10 kmc traveling-wave tube were designed. Exposure to air appears to be deleterious to the performance of tunnel cathodes. Although no efforts were made to actually construct a 10 kmc tunnel cathode TWT, on the basis of our work to date it appears that such a TWT is feasible. A difficult life problem still exists. (Author)

AD-406 470 Div. 25
(TISTP/RLG) OTS price $1.60

Mitre Corp., Bedford, Mass.
SOME CHARACTERISTICS OF EVAPORATED ELECTROLUMINESCENT PHOSPHOR FILMS,
by J. V. Hirsch. May 63, 13p. W5582
Contract AF33 600 39852, Proj. 708
ESD TDR63 169
Unclassified report

Descriptors: *Electroluminescence, *Phosphorescent materials, Electromagnetic properties, Capacitance, Vapor plating, Vacuum apparatus, Brightness, Spectra (Visible and ultraviolet), Electric potential, Films, Resistance (Electrical), Measurement, Evaporation, Manufacturing methods.

Vacuum deposited electroluminescent phosphor light sources have characteristics radically different from conventional electroluminescent panels. This paper describes the fabrication and some characteristics of films composed of yellow (ZnS:Mn;Cl) and green (ZnS:Cu,Pb;Cl) phosphors. Among the properties studied are brightness levels, spectral distribution and resistance and capacitance measurements. (Author)

AD-406 471 Div. 25
(TISTP/MH) OTS price $1.60

Aeronutronic, Newport Beach, Calif.
RESEARCH ON NON-EQUILIBRIUM PLASMA PHYSICS. Final technical rept.,
by S. R. Byron and W. W. Lawrence. 15 Jan 63, 14p. Pub. U 1985
Contract AF49 638 670
AFOSR 4644 Unclassified report

Descriptors: *Plasma physics, Gas ionization, Recombination reactions, Gases, Helium, Argon, Mercury, Cesium, Magnetohydrodynamics, Nozzles, Electric propulsion, Magnetic fields, Fluid flow, Shock waves.

An experimental study of shock waves produced in a T-tube and a theoretical study of electron-ion reaction rates are summarized. Precursor ionization in the T-tube was observed, but no conclusive evidence concerning the source of the ionization was obtained. The study of electron-ion reaction rates resulted in a detailed theory for the rate of three body electron-ion recombination and radiative decay in monatomic gases. Comparison of this theory with published measurements in helium, argon, mercury, and cesium shows very good agreement. (Author)

AD-406 472 Div. 25
(TISTP/AM) OTS price $2.60

Westinghouse Electric Corp., Pittsburgh, Pa.
THE MIGRATION OF A LIQUID ZONE THROUGH A SOLID, PART I,
by W. A. Tiller. 18 Dec 62, 14p.
AFOSR 4645, pt. 1 Unclassified report

Descriptors: *Zone melting, *Electric fields, Theory, Diffusion, Thermal diffusion, Anisotropy, Solids.

The migration of slab, cylindrical and spherical zones through a block of solid under the influenc of a temperature gradient has been analyzed theoretically. The migration rate is found to be directly proportional to the temperature gradient in the system and to depend upon orientation - dependent atomic kinetics of the melting and freezing processes. The magnitude of the atomic kinetic effect depends upon the size of the molten zone. Stable zone migration occurs only in certain crystallographic orientations. The theory is discussed in terms of the limited experimental results available. (Author)

AD-406 473 Div. 25
(TISTP/WA) OTS price $1.60

Westinghouse Electric Corp., Pittsburgh, Pa.
A SEARCH FOR HOST SENSITIZED LUMINESCENCE OF RARE EARTH IONS IN Sr2ZrP2O9,
by N. T. Melamed and D. E. Harrison. 28 Dec 62, 11p. SP62 944 116P8
Contract AF49 638 1177
AFOSR 4647 Unclassified report

Descriptors: *Rare earths, *Phosphorescent materials, *Sensitivity, Ions, Phosphorus, Strontium, Zirconium, Europium, Luminescence, Mathematical analysis, Excitation.

The compound Sr2ZrP2O9 belongs to a family of host luminescent materials whose properties appeared to be favorable for the production of host-sensitized luminescence. However, measurements which were performed on this compound activated by rare earths indicated that little or no sensitization was taking place. An estimate of the expected sensitized luminescence yields indicates that the failure to obtain sensitization can be accounted for by the low oscillator strengths of the rare earth ions. It suggests that rare earth ions are in general not well suited as activators in host sensitized systems except at comparatively high concentrations. (Author)

AD-406 474 Div. 25
(TISTP/AM) OTS price $2.60

Westinghouse Electric Corp., Pittsburgh, Pa.
THE MIGRATION OF A LIQUID ZONE THROUGH A SOLID, PART II,
by W. A. Tiller. 18 Dec 62, 14p. SP62 944 116 P7
AFOSR 4646, pt. 2 Unclassified report

Descriptors: *Zone melting, *Electric fields, Theory, Anisotropy, Diffusion, Thermal diffusion, Solids.

The migration of slab, cylindrical and spherical zones through a block of solid under the influence of an electric field gradient has been analyzed theoretically. It was determined that the zone could migrate either up or down the field gradient, E*, depending upon the magnitude and sign of (i) the effective ionic mobility of the solvent atoms, U, (ii) the Peltier coefficient at the solid-melt interface, and (iii) the imposed temperature gradient, G*. (Author)

AD-406 475 Div. 25
(TISTM/EJH) OTS price $1.10

Westinghouse Electric Corp., Pittsburgh, Pa.
MEASUREMENT OF STACKING FAULT PROBABILITIES IN BULK SPECIMENS,
by H. M. Otte, D. O. Welch and G. F. Bolling.
29 Nov 62, 5p.
Contract AF49 638 1029
AFOSR 4658 Unclassified report

Descriptors: *Deformation, *Lead, *Single crystals, Stresses, Elasticity, Mathematical analysis, Reflection, X-rays, Crystal lattices.

The presence of residual elastic strains in deformed bulk specimens can contribute to the shifts of X-ray reflections. This is important in elastically anisotropic face-centered cubic metals and can contribute to calculations of stacking-fault probabilities. An example of such an effect in measurements on zone-refined lead at 4.2 K is examined. (Author)

AD-406 478 Div. 25
(TISTP/FR) OTS price $4.60

Varian Associates, Palo Alto, Calif.
HIGH POWER R-F WINDOW STUDY PROGRAM.
Quarterly technical note no. 3, 1 Jan-31 Mar 63
by Floyd Johnson. 31 Mar 63, 41p. VRN304 3Q
Contract AF30 602 2844, Proj. 5573, Task 557303
RADC TDR63 194
Unclassified report

Descriptors: *Waveguide windows, Quartz, Sapphires, Beryllium compounds, Aluminum compounds, Oxides, Tests, Failure (Mechanics).

A study was made of the possibilities of waveguide window synthesis by computer solution of a multiple complex matrice equation. A 100-% bubble-free fused quartz window was fabricated and tested in the ring resonator. This window became visibly red hot at 190 kw CW, which is about twice the power level at which failure occurred in several previously tested windows made of a poorer grade of quartz. Another difference in this test was that the quartz itself did not deform. One single-disc, 0-degree-cut synthetic sapphire window assembly was completed. The broadbanding of half-wavelength block windows was examined and a complete example of the process for a beryllium oxide window is demonstrated. Techniques for mode shifting and impedance matching are discussed. One sample of a BeO block window was tested, without failure, to 222 kw CW in the ring resonator. Several half-wavelength block windows fabricated, using AL300, AL399 and AL995 ceramics, were tested to failure in the ring resonator. The failure in all cases is a vertical crack across the center of the face of the block and perpndicular to the broadwall. The power level at which these failures occurred was approximately 100 kw. (Author)

AD-406 617 Div. 25
(TISTP/TCG) OTS price $2.60

Yale U. Observatory, New Haven, Conn.
DEPARTURES FROM LTE IN EMISSION AND ABSORPTION BY CONTINUOUS ENERGY STATES. I. RADIATIVE EQUILIBRIUM.
Interim technical rept.,
by Ludwig Oster. Mar 63, 18p.
Contract AF33 657 7271, Proj. 7073, Task 707301
ARL 63 63 Unclassified report

Report on Research on Plasma Dynamics.

Descriptors: *Nuclear energy levels, *Thermodynamics, *Nuclear particles, Absorption, Emissivity, Plasma oscillations, Gas ionization, Radiochemistry, Solar radiation, Masers, Theory, Thermionic emission, Integral equations, Equations of state, Chemical equilibrium.

A general formulation of the theory of departures from local thermodynamic equilibrium (LTE) in free-free emissions and absorption is developed. The problem is treated subject to the restrictions to steady state and radiative interactions. Particle distribution function and radiation field are studied separately, special attention is given to the transfer problem. The possibility of negative absorption (maser action) is discussed. (Author)

AD-406 633 Div. 25
(TISTP/WH) OTS price $4.60

Sandia Lab., Albuquerque, N. Mex.
SUMMARY OF SHERWOOD ACTIVITIES. SUPPLEMENTARY REPORT.
15 Feb 63, 37p.
Unclassified report

Descriptors: *Thermonuclear reactions, *Plasma physics, Magnetic pinch, Acceleration.

AD-406 716 Div. 25
(TISTM/EJH) OTS price $5.60

Minnesota U., Minneapolis.
DAMPING OF MATERIALS UNDER BIAXIAL STRESS,
by P. J. Torvik, S. H. Chi, and B. J. Lazan.
May 63, 45p.
Contract AF33 657 7453, Proj. 7351, Task 735106
ASD TDR62 1030 Unclassified report

Descriptors: *Damping, *Deformation, *Plasticity, Hysteresis, Stresses, Mathematical analysis, Steel, Copper, Manganese alloys, Copper alloys, Cobalt alloys, Test equipment, Instrumentation, Structures, Materials, Mathematical prediction.

A new theory of combined stress damping is developed and evaluated on the basis of experimental results for several materials. It is concluded that the new theory should be limited in application to materials whose dominant damping mechanism is known to be plastic deformation. It appears that a separate theory of combined stress damping may be required for each mechanism of damping. (Author)

AD-406 718 Div. 25
(TISTM/EJH) OTS price $2.60

Florida U. Engineering and Industrial Experiment Station, Gainesville.
A STUDY OF UNDERWATER PROPAGATION FROM A HIGH-POWER ELECTRICAL DISCHARGE.

Final technical rept.,
by M. J. Larsen, M. M. Newman, and O. R. Gano.
June 63, 21p.
Contract Nonr58010, Proj. NR371 340
Unclassified report

Descriptors: *Electric discharges, *Acoustics, *Underwater sound signals, Sea water, Underwater sound, Sound transmission, Underwater sound equipment, Air, Propagation.

This report considers some acoustical observations resulting from a high-power electrical discharge. One of the main objectives in making acoustical tests was to obtain some kind of measure of the ratio of the radiated acoustical energy to that of the electrical energy of the discharge. For the tests made under sea water this ratio was observed to be on the order of 1 to 1000, while using a simple non-optimized discharge electrode design. Measurements made of air-to-water electrical discharges, as for example, a simulated lightning discharge to the surface, revealed substantially negligible underwater acoustical response. (Author)

AD-406 722 Div. 25, 4
(TISTM/EJH) OTS price $3.60

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
FERROELECTRICITY AND THE CHEMICAL BOND IN PEROVSKITE-TYPE OXIDES,
by Carl W. Nelson. May 63, 31p. TR179
Contracts AF19 604 6155 and AF33 604 8353
Unclassified report

Descriptors: *Ferroelectricity, *Ferroelectric materials, *Chemical bonds, *Antiferroelectricity, Atomic orbitals, Electron transitions, Stereochemistry, Barium compounds, Titanates, Tungstates, Ions, Crystal structure, Nuclear magnetic resonance, Oxides.

A molecular-orbital approach provides insight into the nature of the occurrence of ferroelectricity and antiferroelectricity in perovskite-type oxides. The formation of pi bonds, in addition to the sigma bonds in $BaTiO_3$ structures and isomorphous compounds, leads to a strong mutual interaction along a chain. The absence or presence of pi bonding perpendicular to the axis of the strong interaction leads to chain alignments that are ferroelectric or antiferroelectric, respectively. The role played by the cuboctahedral-coordinated cation is described. Comparison of the environment of a cation in acid solution and in perovskite-type oxides reveals great similarity of bonding. By application of group-theoretical methods, a symmetry classification of orbitals is derived for each molecular point group occurring in $BaTiO_3$. Molecular-orbital energy-level diagrams are constructed. The number and classification of the electronic transitions are predicted by means of the selection rules. It is shown that only ions with empty d shells are capable of forming ferro- and antiferroelectric perovskite-type oxides. A discussion of conductivity in these materials is given. (Author)

AD-406 762 Div. 25
(TISTP/TL) OTS price $2.60

J. G. Engineering Research Associates, Baltimore, Md.
ELASTIC AND PLASTIC BEHAVIOR OF CYLINDRICAL SHELLS UNDER DYNAMIC LOADS BASED ON ENERGY CRITERIA,
by Joshua E. Greenspon. Feb 63, 18p. TR3
Contract DA36 034ORD3081RD
Unclassified report

Descriptors: *Cylindrical bodies, *Hemispherical shells, Loading (Mechanics), Integrals, Deformation, Theory, Load distribution, Shear stresses, Stresses, Materials, Failure (Mechanics), Deflection, Elasticity, Plasticity.

26. PRODUCTION AND MANAGEMENT

AD-406 125 Div. 26, 17
(TISTM/AMS) OTS price $4.60

Westinghouse Electric Corp., Blairsville, Pa.
HIGH ENERGY RATE EXTRUSION PROGRAM.
Interim technical progress rept. no. 10,
1 Feb-31 May 63,
by J. M. Rippel. 31 May 63, 40p.
Contract AF33 600 41948, ASD Proj. 7 882
ASD TR7 882 X, vol. 10 Unclassified report

Descriptors: *Extrusion, *Manufacturing methods, *Steel, Velocity, Titanium alloys, Aluminum alloys, Vanadium alloys, Surface properties, Dies, Ceramic coatings, Graphite, Lubricants, Stainless steel, Experimental data.

A series of high-velocity extrusions were made which demonstrated the reproducibility of this process for making Tee shapes 2 inches by 1 inch by .050 inches from Ti-6Al-4V, AISI 4340 and 304 stainless steel. Nominal surface finish of eleven extrusions was 80 RMS. Thickness variation on the stem and flanges was normally .002 inches to .003 inches. Radii at the intersection of the stem and flange were under .03 inches. The extrusions were made on a Dynapak high-velocity extrusion press manufactured by General Dynamics. All the materials were extruded through ceramic coated dies at a reduction ratio of 17:1. The dies were lubricated with graphite and no billet lubrication was used. Lengths obtained varied from 8 feet to 11 feet depending on the power used. The Dynapak machine is capable of producing energies of approximately 300,000 foot pounds. (Author)

AD-406 719 Div. 26, 8, 14, 17
(TISTM/AMS) OTS price $6.60

Sperry Gyroscope Co., Great Neck, N. Y.
MANUAL OF METAL-TO-CERAMIC SEALING TECHNIQUES,
by C. W. Johnson and E. W. Cheatham. May 63, 55p.
NA27 0001
Contract AF30 602 2371, Proj. 5573, Task 557303
Unclassified report

Descriptors: *Seals (Stoppers), *Metals, *Ceramic materials, Metal seals, Design, Cleaning, Plating, Electroplating, Brazing, Test methods, Tests, Thermal expansion, Copper, Nickel, Steel, Molybdenum, Soldering alloys, Data, Manufacturing methods.

This manual catalogues the variety of processes required to fabricate metal-to-ceramic seals, with recommendations as to the relative degrees of importance in controlling various phases of the operations. Some of the techniques employed in fabricating seals and controlling the known variables are described; the ceramic engineer can select those suitable for his particular needs. The organization of this

manual is patterned after the normal work flow, from raw materials to finished product: selection of raw materials; seal design; parts preparation and metallizing; fixtures and assembly; brazing; control testing; and failure analysis. (Author)

27. PROPULSION SYSTEMS

AD-405 960 Div. 27, 32, 12, 10, 21
(TISTM/PCR) OTS price $2.60

Defense Documentation Center, Cameron Station, Alexandria, Va.
PROPULSION HARDWARE.
June 63, 23p.
Unclassified report

Descriptors: *Bibliographies, *Abstracts, *Propulsion, Rocket propellants, Thermodynamics, Rocket propulsion, Nuclear propulsion, Thermonuclear reactions, Guided missiles (Surface to surface), Rocket motors, Design, Jet engines, Aircraft nuclear propulsion, Satellites (Artificial), Photons, Space flight, Spacecraft, Ion engines, Astronautics, Solid rocket propellants, Propellant grains, Radiation measurement systems, Nuclear engineering, Electric power production, Lunar probes, Cosmic rays, Sounding rockets, Antimissile defense systems, Guided missiles (Surface to air).

AD-405 970 Div. 27, 25
(TISTE/OHD) OTS price $2.60

Illinois U., Urbana.
AN EXPERIMENTAL STUDY OF THERMAL ELECTRIFICATION OF A GAS-SOLID SYSTEM,
by S. L. Soo and R. C. Dimick. Apr 63, 16p.
TR ILL11P
Unclassified report

In cooperation with Virginia U., Charlottesville, Va., Contract Nonr362300, Proj. NR098 038. Report on Proj. SQUID.

Descriptors: *Plasma physics, *Gas ionization, *Gas ionization, Mathematical analysis, Bessel functions, Temperature, Glow discharges, Electric arcs, Powders, High-temperature research, Nozzles, Electrons, Electrostatic generators, Charged particles.

A preliminary experimental study was carried out on the thermal electrification of a gas-solid system and removal of electrons from an ionized gas by charged solid particles. These effects were confirmed. (Author)

AD-406 207 Div. 27
(TISTA/PCR) OTS price $4.60

Wright Aeronautical Div., Curtiss-Wright Corp., Wood-Ridge, N. J.
ADVANCED HEAT TRANSFER ELEMENTS FOR LIQUID METAL REGENERATOR SYSTEMS.
Final rept.,
by L. R. Cox, R. Gill, and F. W. Saco. 30 Apr 63, 1v. SR CTR00 272
Contract NOw62 0601
Unclassified report

Descriptors: *Turbopropeller jet engines, Fuel consumption, Design, Weight, Fins, Pipes, Manufacturing methods, Feasibility studies, Materials, Aluminum alloys, Bronze, Copper, Stainless steel, Coatings, Regenerative cooling (Rockets), Liquid metals, Heat exchangers, Heat transfer.

This report summarizes the work accomplished on the feasibility of extending the materials and design restrictions of current finned tube heat transfer elements to provide lighter weight, high performance liquid metal regenerator systems. Under this program the following items were investigated: (a) Fin Design, (b) Fin Material, (c) Fin Protection, and (d) Fin Thickness. Metallurgical, analytical, and fabrication studies performed show that significant improvements in heat exchanger weight can be achieved by the use of finned tubes made with extended surfaces of aluminum bronze. (Author)

AD-406 455 Div. 27, 9
(TISTA/GEC) OTS price $3.60

Naval Ordnance Lab., White Oak, Md.
HEAT TRANSFER TO THE THROAT REGION OF A SOLID PROPELLANT ROCKET NOZZLE,
by Roland E. Lee. 26 Feb 63, 1v.
Task 456
NOL RN TR62-72; ARR178 Unclassified report

Descriptors: *Rocket motor nozzles, *Nozzle inserts, Rocket motors (Solid propellant), Test methods, Measurement, Instrumentation, Programming (Computers), Numerical analysis, Conical nozzles, Turbulence, Turbulent boundary layer, Thermal conductivity, Heat transfer.

A combined experimental and analytical method for obtaining the surface heat-transfer rate in a rocket nozzle was developed at the Naval Ordnance Laboratory. This method is particularly applicable to high energy rocket nozzle flow where instrumentation directly on the flow surface is impractical. The method employs data of the temperature-versus-time history of two points within the nozzle wall with one of them near the surface of the nozzle. The temperature distribution between the two points and the temperature of the nearby nozzle surface are computed on the IBM 7090 using the implicit numerical solution to the one-dimensional transient heat conduction equation. The heat-transfer rate at the nozzle surface is then calculated from the computed temperature gradient at the surface. Application of this method to determine the heat-transfer rate at the throat of a molybdenum insert in a conical solid propellant rocket nozzle is presented. The nozzle was operated at nominal chamber conditions of 1150 psia and 2500 K. The experimental data are compared with theoretical predictions and other available experimental results. Good agreement is obtained with turbulent heat-transfer rates computed from the numerical integration of the boundary-layer momentum equation. (Author)

AD-406 460 Div. 27, 12, 30
(TISTA/LSK) OTS price $5.60

Aerojet-General Corp., Sacramento, Calif.
DEVELOPMENT OF PERISCOPE FOR THRUST CHAMBER COMBUSTION ANALYSIS.
Final rept., 15 Apr 62-14 Apr 63,
by J. D. O'Donnell. 28 May 63, 1v.
652SA4 2 2F1, V6
Contract AF04 647 652
Unclassified report

Descriptors: *Combustion chambers, *Combustion, *Rocket motors (Liquid propellant), *Second-stage motors, Test methods, Test facilities, Photographic analysis, Guided missiles (Surface to surface), Stability, Periscopes, Test equipment, Screaming combustion.

The object of the high-frequency combustion instability study was to develop a periscope to permit visual study of high-frequency instability

and other phenomena of the combustion process in full-scale thrust chambers. Emphasis was placed on developing a reliable device to protect the optical system from the heat, erosion, and pressure of combustion, and designing a versatile optical system with a high resolution and wide field of view. The optical system, called a periscope, will be capable of being used for high-speed color photography of the combustion process. (Author)

AD-406 683 Div. 27
(TISTA/LSK) OTS price $3.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
THEORETICAL PERFORMANCE OF SELECTED FLUID INJECTANTS FOR THRUST VECTOR CONTROL,
by R. E. Walker and M. Shandor. Nov 62, 29p. CM1027
Contract NOw62 0604
Unclassified report

Descriptors: *Thrust vector control systems, Theory, Experimental data, Chemical reaction, Thermodynamics, Equations, Mathematical models, Secondary injection.

A linearized model of fluid injection thrust vector control is developed and shown to be in good agreement with experimental data. It is used to predict performance of various fluid injectants (gas and liquid; inert and reactive) in conjunction with a hypothetical rocket. The results are discussed in detail. (Author)

AD-406 727 Div. 27
(TISTA/SAT) OTS price $6.60

Aeronutronic, Newport Beach, Calif.
CHEMICAL CORROSION OF ROCKET LINER MATERIALS AND PROPELLANT PERFORMANCE STUDIES.
Quarterly technical summary rept. no. 4,
by R. C. Oliver, R. W. Baier, D. L. Peters and R. W. Sprague. 15 June 63, 58p. PU2148
Contract NOw61 0905, ARPA Order 22 62, Task E
Unclassified report

Descriptors: *Rocket motor nozzles, *Refractory materials, Tantalum compounds, Stability, Combustion, High temperature research, Heat resistant metals and alloys, Tungsten, Oxides, Carbides, Borides, Nitrides, Ablation, Graphite, Materials, Corrosion.

Studies on the theoretical equilibria resulting from interaction of candidate refractory nozzle wall materials with various chemical species resulting from combustion of rocket fuels have continued. Tantalum carbide was considered in detail, with composition diagrams and saturation parameters reported for its interaction at 1000 psia with AlF3, BF2, BF3, BOF, BeF2, CO, CO2, HCl, HF, H2, H2O, LiF and N2. Similar computations are reported for tungsten interacting with BOF, CO, and CO2, these results representing a revision of data reported in the previous quarterly report under this contract, as necessitated by a recent revision in the thermodynamic data for the tungsten oxides. The oxides are considered briefly as a class for application in oxygen-containing atmospheres, with results given for MgO, HfO2 and ThO2 in CO2. The stability of carbides in nitrogen is also considered. The possibility of extending the isothermal saturation results for pure components at 1000 psia to mixtures at other pressures was considered in some detail, with results that look promising except where multi-atomic species are important which are not considered in the individual cases (e.g., HCN is important in a N2-H2 mixture in equilibrium with graphite, but is not considered with the individual pure reactants). A ''catalog'' of ablation reactions for studies reported previously is included. (Author)

AD-406 781 Div. 27, 17
(TISTA/EJH) OTS price $3.60

Pratt and Whitney Aircraft, East Hartford, Conn.
RESEARCH AND DEVELOPMENT OF TITANIUM ROCKET MOTOR CASE.
Quarterly rept. no. 10, 1 Oct-31 Dec 62,
by H. A. Hauser and W. E. Helfrich. 31 Jan 63, 74p.
Contract DA19 020ORD5230, Proj. TB4 004;
Proj. 5B93 32 004
WAL 766 2 1 9 Unclassified report

Descriptors: *Rocket cases, Metal spinning, Forging, Welds, Hydrostatic pressure, Tensile properties, Manufacturing methods, Rocket closure cups, Vanadium alloys, Chromium alloys, Aluminum alloys, Tin alloys, Molybdenum alloys, Titanium alloys.

This program is aimed at the development of a high-strength, lightweight, titanium alloy pressure vessel of the type used for solid fuel rocket motor cases. B-120 VCA Ti alloy was selected for further investigation. Reported results of recent research include the following: (1) smooth and notched (Kt=8) tensile properties (-40 to 400F) of flow-turned material with hydrogen contents of 70 and 200 ppm; (2) results from cyclic loading and tensile testing (70F) of B-120 VCA titanium alloy TIG welds; (3) tensile and hardness data (70F) for Ti-6Al-6V-2Sn alloy TIG welds; (4) smooth and notched (Kt=8) tensile data (70F) for full scale 40-in. diam. roll-forged rings re-solution treated at 1800F; (5) smooth and notched (Kt=8) tensile properties (70F) of subscale 14-in. diam. and full scale 40-in. diam. flow-turned cylinders; (6) tensile properties of a full scale 40-in. diam. rear dome press-forged in closed dies at 1750F; (7) results from hydrostatically burst testing full-scale component assemblies, one containing a flow-turned cylinder and the other a press forged rear dome; and (8) bend and tensile test data (70F) for Ti-15 Mo alloy sheet stock in the solution treated, and solution treated and aged conditions. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-405 932 Div. 28
(TISTM/DGH) OTS price $4.60

Colorado U., Boulder.
COGNITIVE DETERMINANTS OF ROLE PLAYING,
by O. J. Harvey. 1963, 44p. TR3
Contract Nonr1147 07
Unclassified report

Descriptors: *Images, *Reaction (Psychology), *Personality, Analysis of variance, Behavior, Determinants, Group dynamics, Determination, Projective techniques.

Ten representatives of each of the four major levels of concreteness-abstractness posited by Harvey, Hunt and Schroder (1961) were required to argue in opposition to their own belief concerning whether or not philosophy should be

required as a minor for all college undergraduates. Subjects presented their arguments under either a private condition, in which they were erroneously assured no one would ever know the arguments they presented, or under a public condition, in which they were advised that their tape-recorded arguments would later be heard by a university curriculum committee. In addition to the This I Believe Test, scored for abstractness in two ways, each of the 80 Ss was also administered Rokeach's (1960) scales of dogmatism and opinionation as well as the F Scale, Gough and SANFORD'S Rigidity Scale (1952), the Doodlebug Problem (Denny, 1945) and the WAIS intelligence test. Subjects' tape-recorded arguments were scored on 18 variables of role playing. (Author)

AD-406 223 Div. 28
(TISTM/DGH) OTS price $9.60

Princeton U., N. J.
CONCEPTUAL AND ENVIRONMENTAL COMPLEXITY AS FACTORS IN ATTITUDE CHANGE,
by Peter Suedfeld. May 63, 100p.
Contract Nonr185812 and Grant NSF G21762,
Proj. NR171 055
Unclassified report

Doctoral thesis.

Descriptors: *Behavior, *Reasoning, *Prisoners of war, Adjustment (Psychology), Reaction (Psychology), Sensory deprivation, Confined environments, Propaganda, Motivation, Memory, Factor analysis, Environmental tests, Inhibition, Attitudes.

The effects of reduced environmental complexity on behavior was studied. Many lines of research have indicated that the relationship between the amount of stimulation available from the environment and the development and maintenance of adaptive behavioral patterns is a curvilinear one, both restricted and excessive stimulation being associated with decrements in performance. Schroder, Driver and Streufert (1963) have developed a theoretical system which can be used to characterize the three major components of this relationship - i.e., external inputs, organismic dispositions, and responses. The complexity of inputs is a function of informational load, diversity, and change; that of the mediating internal processes depends upon the conceptual structure of the individual, which may range from highly concrete (simple) to highly abstract (complex); and that of the behavioral output is determined by the degree of differentiation and integration of discrete items of information in arriving at an optimal response. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-406 139 Div. 29
(TISTA/GEC) OTS price $2.60

Navy Mine Defense Lab., Panama City, Fla.
DEVELOPMENT OF EMERGENCY BREATHING APPARATUS,
by W. T. Odum. Apr 63, 21p.
NMDL 197 Unclassified report

Descriptors: *Breathing apparatus, Underwater equipment, Helicopters, Ditching, Safety devices, Naval aircraft, Air sea rescues, Aviation safety, Design.

An emergency breathing apparatus developed at the U. S. Navy Mine Defense Laboratory is described. The apparatus will permit crew members to submerge with the aircraft and make an unhurried, safe, underwater exit. A 15-minute breathing supply is provided in a lightweight, compact, simple and easily maintainable package, which can be used by almost anyone after a short period of instruction. (Author)

AD-406 616 Div. 29
(TISTA/LSK) OTS price $1.10

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
AN EXPERIMENTAL WINTER FLYING GLOVE,
by Paul W. Barnett and Kermit R. Skrettingland.
Jan 63, 7p.
Proj. 8238 1
AAL TN63 1 Unclassified report

Descriptors: *Gloves, Acceptability, Thermal insulation, Polar regions, Flight clothing.

Loss of tactile discrimination and dexterity during critical phases of flight are common to arctic operations. The development of more efficient handwear would greatly enhance flying safety. A mouton glove was designed which maximized insulation and minimized impairment. Following field trials, this glove was compared with the MA-1 glove and the N-4B arctic mitten. Although the experimental glove compared favorably, it possessed no advantages worthy of additional consideration. While significant differences in temperature maintenance of the hand can be attributed to variations in the configuration of equivalent amounts of insulation, these differences (two degrees) are only of academic importance, and diminish with decreasing ambient temperatures. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-405 931 Div. 30
(TISTP/MH) OTS price $3.60

Stanford U., Calif.
A METHOD OF DATA ACQUISITION AND SYSTEM CONTROL THROUGH TIME SHARING OF MIXED INPUTS,
by B. Brentnall and W. H. Horton. Feb 63, 33p.
SUDAER147
Grant AF AFOSR138 63
Unclassified report

Descriptors: *Data transmission systems, Transducers, Measuring devices, Electrical networks, Amplifiers, Frequency converters, Digital recording systems, Electronic recording systems, Control sequences, Data processing systems.

In recent years, the demand for more versatile, remotely readable measuring devices has caused us to progress, for example, from the simple mechanical extensometer to the electrical resistance wire gage and from th purely mechanical dial gage to the variable differential transformer pick up. Instruments of this type -- transducers -- have a common property, viz., they transform some particular physical behaviour into an electrical signal or change thereof. Virtually all quantities with which engineers deal can be so transduced, and the outputs from the devices and varied transducers used cover the whole spectrum of electrical signals- dc,

ac, and frequency. Thus an inexpensive recording system which can accept any or all of these types of input, sample the various channels in turn and present the time dependent data as an accurate numerical quantity is clearly desirable. The purpose of this thesis is to report the progress made in the design of such an instrument. (Author)

AD-406 060 Div. 30, 8
(TISTP/WH) OTS price $4.60

CBS Labs., Stamford, Conn.
FEASIBILITY STUDY FOR A THIN FILM MEMORY SYSTEM.
Final rept.
28 May 63, 20p.
Contract NObsr87314, Proj. SF007 01 01, Task 7131
Unclassified report

Descriptors: *Thin films (Storage devices), *Computer logic, Nickel alloys, Iron alloys, Cobalt alloys, Switching circuits, Feasibility studies, Timing circuits, Digital computers, Circuits.

The object of this project is to design and develop a feasibility test model of a small, thin film digital memory. The model is to be a 4 word, 2 bits/word, nondestructive, linear select memory Readout and write-in is to be in parallel at a clock frequency of 5 mc, and addressing was to be sequential. The memory element to be used is the toroidal thin film Ni-Fe-Co ''toristor''. The toristor is a thin film Ni-Fe-Co cylinder which has been plated on either a glass capillary tube or a stainless steel hypodermic tube. Though its switching characteristics are similar to the planar dot memory element, it offers the following advantages: (1) a much larger output signal; (2) nondestructive read characteristic; (3) relative freedom from the destructive effect of strong magnetic field. (Author)

AD-406 071 Div. 30
(TISTP/FR) OTS price $3.60

Aerial Measurements Lab., Northwestern U., Evanston, Ill.
SOLID STATE ANALOG-TO-DIGITAL CONVERTER.
Quarterly progress rept. no. 4, Feb-Apr 63,
by Paul G. Sedlewicz and Robert E. Onley.
Apr 63, 32p. M385
Contract NOw62 0749d
Unclassified report

Descriptors: *Semiconductors, Single crystals, Silicon, Electric currents, Electrical potential, Measurement, Equations, Silicon.

Equations are given for the movement of the depletion region and for multiple probe cutoff. The movement of the depletion region along the bevel is related to an abrupt junction movement times the amplification angle of the bevel. An empirical equation relating the probe current to the reverse bias of the PN bevel is given for the cutoff characteristics. (Author)

AD-406 138 Div. 30
(TISTP/MFA) OTS price $9.10

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
LISP 1.5 PROGRAMMER'S MANUAL,
by John McCarthy, Paul W. Abrahams, Daniel J. Edwards, Timothy P. Hart, and Michael I. Levin.
17 Aug 62, 99p.
Contract DA36 039sc78108
Unclassified report

In cooperation with Computation Center, Mass. Inst. of Tech., Cambridge.

Descriptors: *Programming languages, Data storage systems, Computer storage devices, Magnetic core storage, Magnetic tape, Computer logic, Input-output devices, Punched cards, Instruction manuals, Dictionaries, Mathematical logic.

AD-406 144 Div. 30, 22, 14
(TISTM/AAR) OTS price $1.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
ESTIMATION OF BORON GLAZE ON EIMITE IGNITER COMPOSITION,
by Richard M. Abbott, Nathan M. Liszt, and Milton Roth. Mar 63, 11p.
Proj. OMS4110 16 4005 12
FRL TM1131
Unclassified report

Descriptors: *Boron, *Igniters, Determination.

The method described in FRL-TN-85 (1) for the determination of the boron content of organoborane compounds was adapted to the estimation of the percentage of boron in boron-glazed Eimite igniter composition. About 6 hours of elapsed time are required, of which 5 are working time, for the performance of a duplicate pair of runs. The average agreement between duplicate runs is 0.04% of the sample. (Author)

AD-406 199 Div. 30
(TISTA/LSK) OTS price $3.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
RADIATION TRANSMISSION THROUGH SHIELDING ARRAYS FOR LOW TEMPERATURE PUMPING SURFACES,
by W. G. Kirby. May 63, 25p.
Contract AF40 600 1000, Proj. 7778; and SN2209, Task 777800
AEDC TDR63 75 Unclassified report

Descriptors: *Test facilities, *Cryogenics, Thermal radiation, Low temperature research, Space environmental conditions, Thermal conductivity, Shielding, Low pressure research, Altitude chambers, Surface temperatures, Pumps.

The results of an investigation to determine the amount of thermal radiation transmitted through two cryosurface configurations are presented. The configurations were composed of a 20 K cryosurface enclosed in a 77 K box with a test opening shielded by an optically dense array of 77 K cryosurfaces coated with Parson's black. Radiation at various levels of intensity was applied to the shielding array opening, and the heat load on the 20 K cryosurface imposed by energy transmitted through an array was measured. Heat transmission was also investigated with frost layers deposited over the Parson's black coating on the shielding surfaces. (Author)

AD-406 279 Div. 30
(TISTM/DGH) OTS price $5.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
AUTOMATIC PATTERN RECOGNITION DURING THE PERIOD

1961-1962: AN ANNOTATED BIBLIOGRAPHY.
Rept. for Jan 61-Dec 62,
comp. by Eugene E. Graziano. May 63, 40p.
6 90 63 16; SB63 13
Unclassified report

Descriptors: *Pattern recognition, *Bibliographies, Speech recognition, Data processing systems, Communication theory, Automatic.

One hundred and forty references on all aspects of automatic pattern recognition for the period 1961-1962 are presented. Included are references pertaining to theory and experience with systems, components, methods, optics, speech, etc. The period covered in the search was January 1961 - December 1962. (Author)

AD-406 370 Div. 30, 15
(TISTM/EJH) OTS price $2.60

Florida State U., Tallahassee.
SOME RELATIONSHIPS AMONG SENSORY DIFFERENCE TESTS,
by Ralph A. Bradley. Sep 62, 22p. TR6
Contract Nonr98808, Proj. NR042 004
Unclassified report

Descriptors: *Quality control, *Sensory mechanisms, *Statistical analysis, Tests, Sensitivity, Sense organs, Reliability, Test methods, Mathematical analysis.

Much experimental work and some mathematical analyses were conducted in comparing triangle and duo-trio tests in sensory difference testing. In this paper the existence or conception of subjective responses on a response scale is assumed, and these responses are related to corresponsing probabilities of correct choices in triangle and duo-trio tests and to expected differences from control in the difference-from-control test. The two probabilities mentioned are expressed in terms of the power function of analysis of variance but required special evaluations in this problem. A table showing comparisons of the several tests is presented and includes some comparisons suggested by other authors. With the associations among tests developed, it is now possible to make realistic efficiency comparisons among them. Examples of power efficiency comparisons are given, and it is found that the asymptotic relative efficiency of the triangle test to the duo-trio test is 112%. (Author)

AD-406 608 Div. 30, 24, 6, 5, 2
(TISTP/JEA) OTS price $12.00

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
SPECIALIZED COMPUTER EQUIPMENT FOR GENERATION AND DISPLAY OF THREE DIMENSIONAL CURVILINEAR FIGURES,
by Robert H. Stotz. Mar 63, 154p. ESL TM167
Contract AF33 600 42859, Proj. DSR8753
Unclassified report

Descriptors: *Stereoscopic display systems, *Machine translation, *Computer logic, Digital differential analyzers, Digital systems, Digital computers, Stereoscopic projectors, Cathode ray tube screens, Distribution, Input-output devices, Analog system, Functions, Rotation, Multiple operation, Data storage systems, Display systems, Counting methods, Programming (Computers), Simulation, Projective geometry, Curved profiles.

Studies being conducted of Computer-Aided Design of three-dimensional shaped objects have shown the need for improved graphical man-computer communications, particularly faster displays. A straight-line-and-curve-drawing display system is proposed which is capable of drawing two-dimensional, axonometric projections of curvilinear three-dimensional figures at up to 100 times the speed of present point-plotting display scopes. Two basic elements are compared as building blocks for the Line Generator and Rotation Matrix: the Binary Rate Multiplier (BRM) and the Digital Differential Analyzer (DDA). The operating principals of these units are described and their differences as computing elements for this system are analyzed. Additions to the display system permitting generation of stereoscopic and perspective projections are also described, and figures resulting from simulations of these systems are shown. It is concluded that a display system with an incremental computing capability will provide a sound basis for future work in Computer-Aided Design. (Author)

AD-406 622 Div. 30
(TISTE/CAM) OTS price $1.10

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
THE DEPENDENCE OF DYNAMIC STRENGTH OF CYLINDRICAL PRESSURE VESSELS ON GEOMETRICAL PARAMETERS,
by A. MacKenzie and E. Dalrymple. May 63, 10p.
Proj. 502 05 021
FRL TM1206 Unclassified report

Descriptors: *Pressure vessels, *Cylindrical bodies, Containers, Pressure, Rupture, Geometric forms, Design, Experimental data, Theory, Charges (Explosive).

Experimental information was obtained by detonating spheres of C4 explosive centrally located in cylindrical containers. Slightly different results would be expected for other explosives. End capping was accomplished by placing the pipe in a vertical position, standing on a steel plate. Another thick steel plate was placed over the open top end of the cylinder and the assembly was loaded down with about 500 lbs of lead. With this system, explosive spheres of different masses were detonated inside the cylinders to determine the maximum amount of explosive that could be contained without rupture, inside various cylinders. Only one shot was fired in each cylinder. The techniques of end capping in this experiment is not critical if the cylinders have a length of 5 or 6 times the inside diameter. The side wall of the cylinder receives the first impulse before the end plates experience any disturbance. High-speed photographs were taken of an expanding aluminum pipe loaded with 12 gms of explosive. The outside diameter was 3 inches and the wall thickness 1/4 inch. The expansion took place in about 50 microsec. (Author)

AD-406 707 Div. 30, 2, 22
(TISTP/GRW) OTS price $1.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
WIND INSTRUMENTATION RESEARCH FACILITY AT WHITE SANDS MISSILE RANGE,
by Roy I. Glass, Jr. and James A. Martin. May 63, 15p.
AERDA ERDA24 Unclassified report

Descriptors: *Wind tunnels, *Meteorological instruments, Meteorological parameters, Test equipment, Test facilities, Rocket research, Anemometers, Manometers, Instrumentation, Calibration.

The Wind Instrument Research Facility, a closed-circuit type of wind tunnel, was installed recently at White Sands Missile Range. It is

utilized for calibration of, and research work on, wind instrumentation. Salient features are wind speeds from 0.5 to 85 mph with control capabilities of 0.1 mph increments in the low velocities, low turbulence levels in the 4 x 4 x 6 ft test section, and instrumentation including a Prandtl tube, a mean-velocity hot wire, and eddy-shed hot-wire wind speed measuring devices, a yaw probe directional device, and a turbulence hot wire system. (Author)

31. SHIPS AND MARINE EQUIPMENT

AD-406 132 Div. 31
(TISTE/JBM) OTS price $3.60

Philadelphia Naval Shipyard, Pa.
COLLECTION OF LETTER REPORTS OF VIBRATION SURVEYS ISSUED DURING 1962,
by F. A. Heinze and D. S. Brogden. 1962, 38p.
Unclassified report

Descriptors: *Ships, *Vibration, *Naval vessels (Combatant), Ship hulls, Tests, Ship noise, Ship turbines, Destroyers, Frigates, Aircraft carriers, Submarines.

AD-406 195 Div. 31, 9
(TISTE/OHD) OTS price $2.60

Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
LONGITUDINAL BLADE-FREQUENCY FORCE INDUCED BY A PROPELLER ON A PROLATE SPHEROID,
by S. Tsakonas and J. P. Breslin. Mar 63, 19p. 855
Contract Nonr26316, Proj. S R009 01 01 and DL Proj. HZ1863
Unclassified report

Descriptors: *Propellers (Marine), *Spheres, Mathematical analysis, Vibration, Hydrodynamics, Ellipsoids, Integral equations, Theory, Wake.

An expression was developed for the longitudinal component of the vibratory force exerted on a prolate spheroid by the operation of a marine propeller in a space-varying field (wake). Two evaluation schemes were considered: one by integration of the pressure signal over the surface of the ellipsoid and the other by means of Lagally's theorem with the ellipsoid represented by a known source-sink distribution. Numerical calculations indicate the important role played by propeller clearance and slenderness ratio in the magnitude of the vibratory force. (Author)

AD-406 197 Div. 31, 9
(TISTE/JBM) OTS price $8.10

Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
METHOD OF PREDICTING COURSE STABILITY AND TURNING QUALITIES OF SHIPS,
by Winnifred R. Jacobs. Mar 63, 1v. 945
Contract Nonr26340, Proj. LZ2388 041
Unclassified report

Descriptors: *Ships, *Ship hulls, Ship models, Maneuverability, Analysis, Hydrodynamic configurations, Geometric forms, Prismatic forms, Theory, Bodies of revolution, Mathematical analysis, Fluid dynamic properties, Stability.

An analytical method combining simplified potential flow theory and low aspect-ratio wing theory with empirical modifications for a real viscous fluid is used to predict the stability derivatives (first order hydrodynamic force and moment derivatives) of a family of hulls in order to estimate the dependence of geometric characteristics of course stability and turning or steering qualities. The hulls are Taylor Standard Series forms with after deadwood removed and have the same length and prismatic coefficient but varying length-draft and beam-draft ratios and skeg area. Comparison between the values calculated by this method and those obtained from experimental measurements shows good agreement. The analytical method can predict the relative effects of the geometrical characteristics. Calculated magnitudes are slightly different from the experimental. However, since the hulls tested have the same prismatic, the empirical modification for the rotary moment derivative which is a function of prismatic coefficient was fully tested. (Author)

AD-406 254 Div. 31, 26, 30
(TISTE/CAM) OTS price $11.50

Todd Shipyards Corp., San Pedro, Calif.
NUMERICALLY CONTROLLED SHIPYARD FABRICATING EQUIPMENT. VOLUME 6, SUMMARY REPORT.
Final rept., Apr 61-Mar 63.
Mar 63, 1v. TR3 0 0
Contract NObs4427
Unclassified report

Descriptors: *Industrial equipment, *Ship hulls, *Computer logic, Ship plates, Ship structural components, Configuration, Control, Automatic, Machines, Cutting tools, Machine tools, Positioning devices (Machinery), Metal forming presses, Tables, Computers, Programming (Computers), Design.

A description is given of the conventional methods of lofting and fabricating ship parts and concepts are presented for replacing these methods with mathematical lofting and numerically controlled or automatic processes. Presented are: (1) specifications for numerically controlled flame and plasma-arc cutting machines; (2) design concepts and specifications for stretchforming machines; (3) design concepts and specifications for a machine for cutting shell plate after forming; and (4) procedure for making a cost analysis of the proposed process. Recommendations are made for continuing development of the new concepts presented toward the goal of reducing ship construction costs. (Author)

AD-406 276 Div. 31, 26
(TISTE/JWS) OTS price $12.00

Todd Shipyards Corp., San Pedro, Calif.
MATHEMATICAL SHIP LOFTING. SUMMARY REPORT.
Final, Vol. 3, Apr 61-Mar 63.
Mar 63, 1v. TR1 50
Contract NObs4427
Unclassified report

Descriptors: *Fairing, *Ships hulls, *Programming (Computers), Curve fitting, Vector analysis, Numerical analysis, Ship structural components, Mathematical models, Mathematical prediction.

The formulation for mathematically fairing curves and surfaces presented in Volume 3 has proved capable of economically fairing large areas of the molded form up to half the ship in size. In addition, a satisfactory method was developed for fairing mathematically the extreme ends where discontinuities occur. The joining of these

several faired surfaces to form a single fair surface has not yet been successfully demonstrated. The fairing method was incorporated in a system of programs which provide loft data mathematically. Some of these programs were actually used for producing loft data. Several elements of the fairing system require additional development work. These items are listed. There is a need to reduce the size and density of the problem so that larger surfaces ccccccan be handled more efficiently. Production use of the fairing method itself should be attempted only after the additional work recommended has been completed. Suggestions for the solution of these problems are offered. The effort still needed is small compared to that already expended in formulating the method itself and demonstrating the system presented. (Author)

AD-406 280 Div. 31, 26, 30
(TISTE/CAM) OTS price $14.50

Todd Shipyards Corp., San Pedro, Calif.
PROGRAMMING SYSTEM FOR NUMERICALLY CONTROLLED FLAME CUTTING OF SHIPS PARTS. OPERATING MANUAL.
Final rept., vol. 4, Apr 61-Mar 63.
Mar 63, 1v. TR5 0 0
Contract NObs4427

Unclassified report

Descriptors: *Torches, *Programming (Computers), Errors, Computer logic, Cutting tools, Tables, Positioning devices (Machinery), Mathematical analysis, Design, Punched cards, Punched tape, Typewriters, Ships structural components.

An operating manual for a programming system for numerically controlled flame cutting of ships parts is presented. Computer programs, complete with operating instructions, flow diagrams, and program listings, are included. Sample programs and special instructions are provided to clarify the use of the system. The system presented has been developed using: (1) IBM-1620 computer, 60K memory, with card and tape input and output; (2) California Computer Products No. 560 digital plotter, connected on-line to the computer; (3) IBM No. 026 printing key punch; (4) Flexowriter No. NC-1; and (5) Air Reduction Company 'Tape-O-Graph' flame cutting machine, with General Electric Co. Mark Century director. Because this equipment was used in developing the system, the programs presented are for these specific units. The System Flow Diagram, using the AUTOMAP II parts programming language and the equipment specified above, is shown. (Author)

AD-406 300 Div. 31, 26, 30
(TISTE/CAM) OTS price $1.60

Todd Shipyards Corp., San Pedro, Calif.
MATHEMATICAL SHIP LOFTING AND NUMERICAL CONTROL OF SHIPYARD FABRICATING EQUIPMENT. PROJECT SUMMARY REPORT.
Final rept., Vol. 1, Apr 61-Mar 63.
Mar 63, 15p. TR900 V1
Contract NObs4427

Unclassified report

Descriptors: *Industrial equipment, *Ship hulls, *Computer logic, Ship plates, Ship structural components, Configuration, Mathematical analysis, Errors, Feasibility studies, Computers, Programming (Computers), Design.

Work performed is presented towards the development of a mathematical lofting system, a parts programming system for numerically controlled flame cutting, and numerically controlled shipyard fabricating equipment. Program accomplishments, conclusions, and recommendations are summarized. (Author)

AD-406 367 Div. 31, 26, 15
(TISTE/JWS) OTS price $1.60

TODD Shipyards Corp., San Pedro, Calif.
MATHEMATICAL SHIP LOFTING. PART I. THEORY.
Final rept. vol. 2, Apr 61-Mar 63.
Mar 63, 15p. TR1 0 0 1, vol. 2
Contract NObs4427

Unclassified report

Descriptors: *Fairings, *Ship hulls, *Programming (Computers), Vector analysis, Curve fitting, Ship structural components, Numerical analysis, Torches, Positioning devices (Machinery), Mathematical models, Mathematical predictions.

The development of a mathematical lofting system, a parts programming system for numerically controlled flame cutting, and numerically controlled shipyard fabricating equipment is described. Program accomplishments, conclusions, and recommendations are summarized. (Author)

AD-406 456 Div. 31
(TISTE/JWS) OTS price $9.10

Massachusetts Inst. of Tech., Cambridge.
THE CONTROL OF HEAVE AND PITCH OF A SEMISUBMARINE IN REGULAR ASTERN WAVES,
by H. M. Jonckheere. Jan 63, 96p.
Contract Nonr184154, Proj. 8073

Unclassified report

Descriptors: *Submarine hulls, Mathematical models, Mathematical prediction, Differential equations, Water waves, Hydrostatic pressure, Buoyancy, Fluid dynamic properties, Special functions (Mathematical), Fins, Pitch (Motion), Models (Simulation), Simulation, Computers, Programming (Computers), Control systems.

The purpose of this investigation was twofold. First, mathematical expressions were sought to represent the coupled heaving and pitching motions of a semisubmarine in astern regular waves. For the sake of simplicity, the linear theory was used; but corrections were made for some nonlinear effects. Since a complete analytical setup of the motions did not give results that corresponded well with experimental values, some correction factors, consistent with the theory, were introduced. In this way reasonable correlation was achieved in the range of experimental results. Once the analytical expression of the motions was found, a mathematical model was set up with a control system; and the motions in waves were simulated on the computer. Different types of controls were studied, which led to a selection of an optimum control device. (Author)

AD-406 694 Div. 31, 9
(TISTE/CAM) OTS price $9.10

Massachusetts Inst. of Tech., Cambridge.
THE CONTROL OF HEAVE AND PITCH OF A SEMISUBMARINE IN REGULAR ASTERN WAVES,
by H. M. Jonckheere. Jan 63, 96p.
Contract Nonr18454, Proj. 8073

Unclassified report

Descriptors: *Submarines, *Pitch (Motion), Mathematical models, Theory, Control systems, Simulation, Equations, Motion, Moments, Hydrodynamics, Ocean waves, Programming (Computers).

Mathematical expressions were sought to represent the coupled heaving and pitching motions of a semisubmarine in astern regular waves. For the sake of simplicity, the linear theory was used;

but corrections were made for so. nonlinear effects. Since a complete analytical setup of the motions did not give results that corresponded well with experimental values, some correction factors, consistent with the theory, were introduced. In this way reasonable correlation was achieved in the range of experimental results. Once the analytical expression of the motions was found, a mathematical model was set up with a control system; and the motions in waves were simulated on the computer. Different types of controls were studied, which led to a selection of an optimum control device. (Author)

AD-406 712 Div. 31
(TISTE/JWS) OTS price $19.75

Todd Shipyards Corp., San Pedro, Calif.
MATHEMATICAL SHIP LOFTING. PART 2. OPERATING MANUAL, APPENDIX D THROUGH K, VOLUME 6.
Final rept. Apr 61-Mar 63.
Mar 63, 1v.
Contract NObs4427

Unclassified report

Descriptors: *Fairings, *Ship hulls, *Programming (Computers), Vector analysis, Curve fitting, Ship plates, Ship structural components, Numerical analysis, Mathematical models, Mathematical prediction.

AD-406 715 Div. 31, 26
(TISTE/JWS) OTS price $23.50

Todd Shipyards Corp., San Pedro, Calif.
MATHEMATICAL SHIP LOFTING. PART 1. THEORY. PART 2. OPERATING. MANUAL, THROUGH APPENDIX C, VOLUME 2.
Final rept.
Mar 63, 1v. TR1.0.0 1 V2
Contract NObs4427

Unclassified report

Descriptors: *Fairings, *Ship hulls, *Programming (Computers), Vector analysis, Curve fitting, Ship plates, Ship structural components, Numerical analysis, Mathematical models, Mathematical prediction.

A method of fairing ships' hulls and obtaining a surface equation representing the ships' hull through the use of linear programming is presented. Methods for producing loft data from this equation are also presented. Operation of the mathematical lofting system is described. Instructions for the computer programs and program listings are given. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-406 291 Div. 32
(TISTM/WA) OTS price $5.60

George Washington U., Washington, D. C.
A STUDY OF THE UTILITY CONCEPT IN ECONOMICS,
by George Madison Lady. 17 May 63, 53p. T157
Contract Nonr761, Proj. NR345 107 and NR047 001, Task 03 and 05

Unclassified report

Descriptors: *Economics, *Game theory, Measurements, Transformations, Statistical analysis, Measure theory, Functions, Logistics.

AD-406 437 Div. 32, 18
(TISTM/DGH) OTS price $1.10

RAND Corp., Santa Monica, Calif.
DISSEMINATORS OF ENMITY,
by Anita Magnus. May 63, 4p. P 2749

Unclassified report

Descriptors: *Cold war, *Political science, *Propaganda, Education, United States government, Department of Defense, Reaction (Psychology), Attitudes, Communism, Universities.

A partial summary and translation of an article by Leonid Velichanskii in the 'Literaturnaia Gazeta,' May 14, 1963, is presented. The article accuses various institutions and organizations of promoting cold war policies and of producing books 'full of slanderous fabrications about the Communist party and people.' (Author)

AD-406 730 Div. 32, 4,
(TISTM/ODN) (OTS price $1.60

Defense Documentation Center, Alexandria, Va.
SEARCHING CHEMICAL STRUCTURES,
by Julius Frome. 12 June 63, 10p.

Unclassified report

Presented to The Chemistry Section of the Special Libraries Association, 12 June 63, Denver, Colo.

Descriptors: *Molecular structure, *Reviews, *Information retrieval, Search theory, Topology, Bibliographies, Chemical compounds.

A brief review of three fundamentally different ways of looking at the basic unit of chemical information -- the chemical structure for storage and searching is presented. They are: (1) notation systems; (2) topological systems (element by element); and (3) fragmentation schemes. Each has its particular advantages and it is likely that all of the approaches will receive sustained emphasis and use because of the variety of needs in the chemical information retrieval field. Advances in computer technology will play a major role in determining the relative importance and general acceptability of the three directions. (Author)

AD-406 735 Div. 32-All Divisions
(TISTP/EH) OTS price $5.00

Defense Documentation Center, Cameron Station, Alexandria, Va.
SYMPOSIA.
A rept. bibliography for 1950-July 63, comp. by Elizabethe H. Hall and Kayte M. Gibbs.
July 63, 1v.

Unclassified report

Descriptors: *Bibliographies, Aircraft, Astronomy, Geophysics, Geography, Chemical warfare, Biological warfare, Chemistry, Communications system, Detection, Electronic equipment, Electrical equipment, Fluid mechanics, Fuels, Transportation, Guided missiles, Materials, Propellants, Symposia, Mathematics, Medicine, Metallurgy, Military operations, Navigation, Nuclear physics, Nuclear propulsion, Ordnance, Personnel, Photography, Physics, Propulsion systems, Psychology, Supplies logistics, Scientific research, Ships.

A list of symposia references cataloged from 1950 through July 1963 is provided as an aid in determining the extent of information available on subjects of research and development interest. The 1,565 references cited herein cover a wide range of subject areas corresponding to the 33 divisions in the DDC Distribution Guide.

33. TRANSPORTATION

No Entries

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

*Descriptors marked with an asterisk are included in the subject index.

ASTRONOMY

Astrophysics

NASA N63-17216 OTS $1.60

California Inst. of Tech., Pasadena.
INFRARED PHOTOMETRIC MAPPING OF VENUS THROUGH THE 9 - 14 ATMOSPHERIC WINDOW, by Bruce C. Murray, Robert L. Wildey, and James A. Westphal. Rept. on NASA Grant NsG-56-60; NSF-G-25210. 13 May 63, 15p. 13 refs. NASA CR-50149.

NASA N63-17028 OTS $1.60

California Inst. of Tech., Pasadena.
TEN MICRON PHOTOMETRY OF 25 STARS FROM B8 TO M7, by Robert L. Wildey and Bruce C. Murray. Rept. on NASA Grant NsG-56-60. 13 May 63, 20p. NASA CR-50143.

NASA N63-16731 OTS $1.60

Center for Radiophysics and Space Research, Cornell U., Ithaca, N. Y.
STRUCTURE OF THE MOON'S SURFACE, by T. Gold. Rept. on NASA Grant NsG-382. Apr 63, 11p. NASA-CR-50117; CRSR-140.

NASA N63-15936 OTS $4.60

Center for Radiophysics and Space Research, Cornell U., Ithaca, N. Y.
A THEORETICAL PHOTOMETRIC FUNCTION FOR THE LUNAR SURFACE, by Bruce W. Hapke. Rept. on NASA Grant NsG-119-61. Feb 63, 50p. 16 refs. CRSR-138.

NASA N63-16887 OTS $13.10

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
A STUDY OF METEOROID IMPACT PHENOMENA, by William J. Rae and Henry P. Kirchner. Final rept. on NASA Contract NAS3-2121. Feb 63, 183p. 70 refs. CAL-RM-1655-M-4; NASA CR-50171.

NASA N63-17204 OTS $2.60

General Mills Electronics Group, Minneapolis, Minn.
SPUTTERING EFFECTS ON THE MOON'S SURFACE, by G. K. Wehner. Quarterly status rept. no. 3, 18 Oct 62-17 Jan 63, on NASA Contract NASw-424. 30 Jan 63, 27p. 17 refs. Rept. 2364; NASA CR-50229.

NASA N63-17311 OTS $6.60

Geophysics Corp., of America, Bedford, Mass.
PLANETARY AERONOMY VI: ELECTRON TEMPERATURES IN THE IONOSPHERE, by M. B. McElroy, R. J. Moffett, and A. Dalgarno. Rept. on NASA Contract NASw-395. Nov 62, 62p. 26 refs. GCA-TR-62-11-N; NASA-CR-12.

NASA N63-17312 OTS $3.60

Geophysics Corp. of America, Bedford, Mass.
PLANETARY AERONOMY VII: THE SOLAR FLUX INCIDENT AT THE TOP OF THE ATMOSPHERES OF EARTH AND NEIGHBORING PLANETS FOR THE SPECTRAL REGION 50A TO 3000A, by E. D. Schultz and A. C. Holland. Rept. on NASA Contract NASw-395, Nov 62, 35p. 5 refs. GCA-TR-62-14-N; NASA-CR-11.

NASA N63-17313 OTS $3.60

Geophysics Corp. of America, Bedford, Mass.
PLANETARY AERONOMY VIII: A CONGERIES OF ABSORPTION CROSS SECTIONS FOR WAVELENGTHS LESS THAN 3000Å, by E. D. Schultz, A. C. Holland, and F. F. Marmo. Rept. on NASA Contract NASw-395; Contract AF 33(657)9199. Nov 62, 103p. 106 refs. GCA-TR-62-15-N; NASA-CR-15.

NASA N63-17314 OTS $4.60

Geophysics Corp. of America, Bedford, Mass.
PLANETARY AERONOMY IX: THE DARK SIDE AIRGLOW OF VENUS, by Neville Jonathan and George Doherty. Rept. on NASA Contract NASw-395. Feb 63, 44p. 6 refs. GCA-TR-63-1-N; NASA-CR-14.

NASA N63-17315 OTS $8.10

Geophysics Corp. of America, Bedford, Mass.
PLANETARY AERONOMY X: ATOMIC POLARIZABILITIES AND SHIELDING FACTORS, by A. Dalgarno. Rept. on NASA Contract NASw-395. Feb 63, 87p. 96 refs. GCA-TR-63-2-N; NASA-CR-6.

NASA N63-17316 OTS $2.60

Geophysics Corp. of America, Bedford, Mass.
PLANETARY AERONOMY XI: ABSOLUTE INTENSITY MEASUREMENTS IN THE VACUUM ULTRAVIOLET, by J. A. R. Samson. Rept. on NASA Contract NASw-395. Mar 63, 28p. 6 refs. GCA-TR-63-3-N; NASA-CR-7.

NASA N63-17317 OTS $3.60

Geophysics Corp. of America, Bedford, Mass.
PLANETARY AERONOMY XII: THE ROLE OF INTERPLANETARY DEBRIS IN PLANETARY ATMOSPHERES: 1. SODIUM IN THE EARTH'S ATMOSPHERE, by F. F. Marmo and H. K. Brown. Rept. on NASA Contract NASw-395. Mar 63, 38p. 19 refs. GCA TR-63-4-N; NASA CR-13.

NASA N63-17318 OTS $1.60

Geophysics Corp. of America, Bedford, Mass.
PLANETARY AERONOMY XIII: ELECTRON AND ION TEMPERATURE IN THE IONOSPHERE, by A. Dalgarno. Rept. on NASA Contract NASw-701. Apr 63, 20p. 12 refs. GCA-TR-63-11-N; NASA CR-8.

NASA N63-17320 OTS $2.60

Geophysics Corp. of America, Bedford, Mass.
PLANETARY AERONOMY XIV: ULTRAVIOLET ABSORPTION OF SO_2: DISSOCIATION ENERGIES OF SO_2 AND SO, by P. Warneck, F. F. Marmo, and J. O. Sullivan. Rept. on NASA Contract NASw-701. May 63, 25p. 17 refs. GCA-TR-63-13-N; NASA CR-10.

NASA N63-15085 OTS $2.60

Iowa State U., Iowa City.
CHARGED PARTICLE MEASUREMENTS IN THE VICINITY OF VENUS WITH THE SUI EXPERIMENT ON MARINER II, by L. A. Frank, J. A. Van Allen and H. K. Hills. Rept. on NASA Grant NsG-233-62. Feb 63, 24p. SUI 63-6.

NASA N63-15915 OTS $1.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
LUNAR REFERENCE COORDINATES, by C. F. Campen, Jr. Rept. on NASA Contract NASw-6. 29 Dec 61, 7p. JPL-TM-33-72.

NASA N63-17342 OTS $5.60

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
ON A CONSISTENT SYSTEM OF ASTRODYNAMIC CONSTANTS, by Helmut G. L. Krause. 12 Dec 62, 53p. 58 refs. MTP-P&VE-F-62-12; NASA TM-X-50106

PB 163 117 OTS $4.60

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
ELECTRIC FIELDS AND CURRENT FLOWS IN AN AURORAL ARC, by Daniel W. Swift. Scientific rept. no. 4 on Antarctic Research and Data Analysis, Contract NSF-C255. 30 Apr 63, 42p. 5 refs. Technical rept. RAD-TR-63-14.

DESCRIPTORS: *Aurorae, Electric fields, Electric currents, Magnetic fields, Electron density, Electrons, Ions, Ionosphere, *Geophysics, Numerical analysis, Astrophysics, Antarctic regions, Ionospheric disturbances.

Results of a previous paper on the generation and effect of electrostatic fields during an auroral disturbance are extended. The effect of a wind of the neutral atmosphere blowing across a stationary inhomogeneity in electron density created by a stream of ionizing radiation in the E-region of the ionosphere is considered. Equations describing the generated electric field in the horizontal plane are derived, and methods for solution on a digital computer are given. Also, elementary analytical solutions are given. Resulting electric current fields due to the electric field and neutral wind are computed. It is found that the computed current systems do not resemble those deduced from magnetic data. The reasons for the discrepancies are discussed. (Author)

NASA N63-16728 OTS $4.60

Southwest Center for Advanced Studies, Dallas, Tex.
TERMINATION OF SOLAR WIND AND SOLAR MAGNETIC FIELD, by W. I. Axford, A. J. Dessler, and B. Gottlieb. Rept. on NASA Grant NsG-269-62. 26 Oct 62, 43p. 25 refs. NASA CR-50153.

NASA N63-15251 OTS $2.60

Space Sciences Lab., U. of California, Berkeley.
FAULT MECHANICS OF THE LUNAR STRAIGHT WALL AND THE NATURE OF MARE MATERIAL, by Robert G. Strom. Rept. on NASA Grant NsG-145-61. Jan 63, 21p. 15 refs. Series 4, issue 8.

BEHAVIORAL SCIENCES

PB 163 154 OTS $1.10

American Inst. for Research, Pittsburgh, Pa.
TEAM LEARNING AS A FUNCTION OF MEMBER LEARNING CHARACTERISTICS, by David J. Klaus and Robert Glaser. 13 Apr 63, 8p.

DESCRIPTORS: *Learning, *Group dynamics, *Training, Social communication

The principal finding of this study is that differences in team learning can be specifically related to the proficiency which team members attained during prior individual learning.

AD-299 830 OTS $5.60

Institute of Aerophysics, U. of Toronto (Canada).
ANNUAL BULLETIN, 1963, Mar 63, 59p. 13 refs.

DESCRIPTORS: *Catalogs, *Universities, Education.

The Bulletin is intended to serve two main purposes: (1) to provide prospective students of the science and engineering of aeronautics and astronautics, and of plasmadynamics, both undergraduate and postgraduate, with information concerning the programs offered at the University of Toronto in these subjects. This information should be of value to guidance counsellors as well. In this connection, the Bulletin should be read jointly with the relevant University Calendar, i.e. that

of the Faculty of Applied Science and Engineering (undergraduate), or that of the School of Graduate Studies (postgraduate). (2) to serve as a yearbook for the staff and students of the Institute, containing a record of the various activities of interest, and of the student body past and present. (Author)

BIOLOGICAL SCIENCES

TID-17695 OTS $7.60

Argonne National Lab., Ill.
ELECTRON MICROSCOPIC STUDIES ON THE GIANT AMOEBA, PELOMYXA ILLINOSENSIS, by Robert Earle Waterman. Rept. on Contract W-31-109-eng-38. June 62, 80p. 38 refs. UAC-6938.

BNL-6546 OTS $3.60

Brookhaven National Lab., Upton, N. Y.
FUNDAMENTAL PROGRAM OF LATE NEUROLOGICAL EFFECT FOLLOWING ACUTE IRRADIATION, by Y. L. Yamamoto. Rept. on Contract AT-30-2-GEN-16. 26 Oct 62, 39p. 36 refs.

TID-17703 OTS $1.60

Pittsburgh U., Pa.
STUDIES ON THE AUTECOLOGY OF VASCULAR HYDROPHYTES AND THEIR ROLE IN PRODUCTIVITY AND MINERAL CYCLING IN AQUATIC ECOSYSTEMS, by Richard T. Hartman. Rept. on Contract AT(30-1)3018. 15 Jan 63, 20p. 16 refs.

Biochemistry

NASA N63-17219 OTS $8.10

Aeronutronic, Newport Beach, Calif.
EXPERIMENTAL STUDIES FOR THE DETECTION OF PROTEIN IN TRACE AMOUNTS, by R. E. Kay. Final technical rept. on NASA Contract NASr-84. Mar 63, 81p. 26 refs. U-2062; NASA-CR-50385.

TID-18020 OTS $1.60

Bergen U. (Norway)
FRUCTOSE 1,6-DIPHOSPHATE BREAKDOWN IN ESCHERICHIA COLI, by Leiv Klungsöyr, Inger Grundt, and Karen B. Helle. Rept. on Contract IAEA/US. 1962, 11p. 4 refs.

TID-17972 OTS $1.10

Missouri U., Columbia.
[ABSORPTION OF IONS BY PLANT CELLS] by J. Levitt. Final rept. 1 Oct 58-31 Jan 63, on Contract AT(11-1)683. [1963] 7p. 6 refs.

TID-17522 OTS $1.10

New York U., N. Y.
IN VITRO BINDING STUDIES OF RARE EARTHS AND RARE EARTH CHELATES TO PROTEINS AND NUCLEIC ACIDS, by Eugene Y. Berger. Final rept., 1 Dec 61-30 Nov 62, on Contract AT(30-1)3015. 9p. 7 refs.

TID-16795 OTS $2.60

Oregon State U., Corvallis.
THE MODE OF ACTION OF LABELLED 2,4-DICHLOROPHENOXYACETIC ACID AND SIMILAR AGENTS, by S. C. Fang. Final rept. on Contract AT(45-1)304. [1962] 27p. 31 refs.

Medical Specialties and Equipment

PB 163 321 OTS $7.60

Battelle Memorial Inst., Columbus, Ohio.
THE FURTHER DEVELOPMENT AND EVALUATION OF AURAL READING DEVICES FOR THE BLIND, by John S. Abma, Lois L. Huffman and others. Summary rept., 1 July 59-30 June 60, on Contract V1005 M-1961. 30 June 60, 73p. AD-242 223.

DESCRIPTORS: *Reading machines, Design, Circuits, Maintenance, Operation, *Pattern recognition, *Blindness, *Prosthetics, *Training devices, Tracking, Sound signals, Coding.

Eleven blind subjects were divided into three training classes on the basis of their previous training and ability to use the reading devices. Context training resulted in slightly improved scores; more experience and training in the use of context might bring additional improvement. The best reading speed achieved with manual operation of the probe was 15 words per minute. Two experiments were conducted to test the desirability of a mechanical-tracking accessory. The use of a mechanical-tracking simulator gave reliably improved performance for both randomized-alphabet and connected-text reading. Development of a suitable mechanical-tracking device is recommended as an aid for future training. A series of code studies resulted in the recommendation of an improved code. An "automatic shut-off" was devised and installed in all of the prototype reading devices. The shut-off operates when the reader probe is lifted from the printed page, turning off the tones which would otherwise be heard continually. (See also PB 144 748)

BNL-6572 OTS $1.60

Brookhaven National Lab., Upton, N. Y.
USE OF A DIGITAL COMPUTER IN THE DEVELOPMENT OF A POSITION SCANNING PROCEDURE, by James S. Robertson and Arcadio M. Niell. Rept. on Contract AT-30-2-GEN-16. 20p.

PB 163 381 OTS $3.60

Navy Experimental Diving Unit, Naval [Weapons Plant] Washington, D. C.
CALCULATION OF AIR DECOMPRESSION TABLES, by J. V. Dwyer. 29 Nov 55, 39p. Research rept. 4-56.

DESCRIPTORS: Tables, *Decompression, *Diving, Air, Pressure, Tissues (Biology), Numerical methods and procedures.

This report presents the theory of air decompression in didactic form, including definitions, theory of exponential saturation, and theory of tissue ratios. The report provides a procedure for step-by-step calculation of decompression schedules, together with the necessary tables and work sheets. The discussion touches on other methods of calculation, on one use of this method, and on the probable validity of this method. The recommendations are for programming a computer and for using the report as a text. (Author)

PB 163 380 OTS $4.60

Navy Experimental Diving Unit, Naval [Weapons Plant] Washington, D. C.
REPETITIVE DIVING DECOMPRESSION TABLES, by M. des Granges. 9 Jan 57, 50p. 4 refs. Research rept. 6-57.

DESCRIPTORS: *Diving, *Decompression, Tables,

A decompression procedure for repetitive diving to depths of 190 feet was devised employing modified Haldane principles which have been reported previously. The repetitive diving tables provide a system by which a diver can determine the necessary increase in decompression time on the second and successive dives, based on the amount of excess inert gas tension in his body after completion of the previous dive. The amount by which the decompression time must be increased varies inversely with the time (on surface) interval between dives. The information for using this system is obtained from four tables i.e. Decompression Table, No Decompression Table, Surface Interval Table and the Repetitive Dive Table. The validity of this procedure was tested by performing 62 repetitive dives with random combinations of depth, time and surface interval. The procedure as reported is considered satisfactory and is recommended for field use. (Author)

PB 163 382 OTS $7.60

Navy Experimental Diving Unit, Naval [Weapons Plant] Washington, D. C.
STANDARD AIR DECOMPRESSION TABLE, by M. des Granges. 3 Dec 56, 76p. 1 ref. Research rept. 5-57.

DESCRIPTORS: Tables, *Decompression, Air, *Diving, Graphic analysis, Numerical methods and procedures.

This report covers the test and development of a U. S. Navy Standard Air Decompression Table. The results of 609 dives are presented, analyzed and discussed. The various attempts to improve the method of computation are reported in detail and the table resulting from the last attempt is submitted for approval. (Author)

Pharmacology and Toxicology

PB 163 247 OTS $2.60

Army Chemical [Research and Development Labs.] Army Chemical Center, Md.
THE RESPIRATORY EFFECTS OF INHALED TOXIC VAPORS DISPERSED IN AIR. I. AN APPARATUS FOR QUANTITATIVE MEASUREMENTS OF INSPIRATORY AND EXPIRATORY AIR, by Jack P. Saunders and Ralph W. Fogleman. Apr 53, 22p. 11 refs. MLRR no. 179; AD-11 730.

DESCRIPTORS: *Tachometers, *Respiration, Dogs, *Poisonous gases, Toxicity, Vapors, Air, Measurement, *Respirometers.

An apparatus is described for administering a measurable amount of toxic vapors to a dog with a minimum resistance to respiration. A mask was designed which differed slightly from the Snell mask; it consisted of a molded latex rubber cylinder which fitted the muzzle closely and terminated in a cylindrical opening to fit onto mask adapter of a brass valve. The mask had a minimal dead space of 30 to 45 cc; an internal face flange and an external valve system prevented more than 3.9% leakage and allowed sufficient freedom for swallowing. Inspiratory and expiratory air volumes were measured with a simple pneumotachometer. The value of dead space between the 2 volumes was employed to determine the percentage of toxic gases retained. (DDC abstract)

TID-17648 OTS $1.10

New York State U. Research Foundation, Albany.
ACTION OF TRITIATED TETANUS TOXIN AND TOXOID UPON THE ANTIBODY FORMING MECHANISM, by Robert Speirs. Rept. for 1 Apr 62 - 31 Mar 63 on Contract AT(30-1)3024. Dec 62, 9p.

Radiobiology

TID-17641 OTS $3.60

Battelle Memorial Inst., Columbus, Ohio.
EFFECTS OF RADIATION UPON REAGGREGATION OF DISSOCIATED EMBRYONAL CELLS, by R. M. Roppel. Progress rept. on Contract AT(30-1)2961. 28 Nov 62, 40p.

BNL-6575 OTS $2.60

Brookhaven National Lab., Upton, N. Y.
THE EFFECTS OF RADIATIONS OF DIFFERENT LET ON EARLY RESPONSES IN THE MAMMAL, by J. L. Bateman and V. P. Bond. Rept. on Contract AT-30-2-GEN-16. 10 Dec 62, 30p. 33 refs.

BNL-6584 OTS $3.60

Brookhaven National Lab., Upton, N. Y.
THE FATE OF TRANSFUSED H^3-THYMIDINE LABELED BONE MARROW CELLS IN IRRADIATED RECIPIENTS, by T. M. Fliedner, E. D. Thomas and others. Rept. on Contract AT-30-2-GEN-16. [1962] 36p. 29 refs.

BNL-6595 OTS $1.10

Brookhaven National Lab., Upton, N. Y.
INDIRECT EFFECT OF X-RADIATION ON BONE GROWTH IN RATS, by R. A. Conard. Rept. on Contract AT-30-2-GEN-16. 21 Dec 62, 9p. 7 refs.

BNL-780 OTS $2.00

Brookhaven National Lab., Upton, N. Y.
MEDICAL SURVEY OF RONGELAP PEOPLE EIGHT YEARS AFTER EXPOSURE TO FALLOUT, by Robert A. Conard, Leo M. Meyer and others. Rept. on Contract AT(30-2)GEN-16. Jan 63, 76p. 15 refs. T-296.

BNL-6564 OTS $1.60

Brookhaven National Lab., Upton, N. Y.
POSSIBILITIES AND LIMITATIONS IN THE USE OF TRITIATED THYMIDINE FOR IN VIVO CYTOKINETIC STUDIES ON LYMPHORETICULAR TISSUE, by H. Cottier, N. Odartchenko and others. Rept. on Contract AT-30-2-GEN-16, 30 Nov 62, 14p. 30 refs.

BNL-6588 OTS $1.60

Brookhaven National Lab., Upton, N. Y.
TISSUE DISTRIBUTION AND STORAGE FORMS OF VITAMIN B_{12} INJECTED AND ORALLY ADMINISTERED TO THE DOG, by Charles Rosenblum, Peter G. Reizenstein and others. Rept. on Contract AT-30-2-GEN-16. [1962] 14p. 16 refs.

UCLA-510 OTS $8.10

California U., Los Angeles. School of Medicine.
RADIOBIOLOGY. Semiannual progress rept. for period ending 31 Dec 62 on Contract AT(04-1)GEN-12. 89p. 35 refs. NASA N63-12946.

TID-17542 OTS $1.60

Montefiore Hospital, New York.
DISTRIBUTION AND EXCRETION OF RADIOACTIVE RARE EARTH COMPOUNDS IN MICE, by Betty Rosoff, Elsie Siegel and others. Rept. on Contract AT(30-1)1763. [1962] 17p. 21 refs. Prepared in cooperation with Veterans Administration Hospital.

NASA N63-16679 OTS $1.60

Naval School of Aviation Medicine, Pensacola, Fla.
ENERGY DISSIPATION CHARACTERISTICS IN TISSUE FOR PROTON RADIATION IN SPACE. I. COMPARATIVE ANALYSIS OF THE LET SPECTRA OF MONOENERGETIC, FLARE PRODUCED, AND FISSION NEUTRON RECOIL PROTONS, JOINT REPORT OF NASA AND NAVAL SCHOOL OF AVIATION MEDICINE, by Herman J. Schaefer. 24 Jan 63, 14p. 15 refs. NASA Order R-75. Rept. 24 on BuMed Proj. MR005.13-1002; NASA-CR-50044.

TID-17650 OTS $3.60

New York State U. Downstate Medical Center, Brooklyn, N. Y.
EFFECT OF X-IRRADIATION ON THE CELLULAR AND HUMORAL RESPONSES TO ANTIGEN, by Robert S. Speirs. Rept. on Contract AT(30-1)2916. 1962, 36p. 47 refs.

TID-17789 OTS $7.60

New York State Veterinary Coll., Cornell U., Ithaca, N. Y.
FISSION PRODUCT METABOLISM AND RESPONSE IN LABORATORY AND DOMESTIC ANIMALS: PLANNING STUDY FOR EVALUATION OF RADIOACTIVE CONTAMINATION OF THE FOOD CHAIN, by C. L. Comar, R. H. Wasserman, and others. Progress rept., 1 Apr 62-31 Jan 63 on Contract AT(30-1)2147. 75p. 28 refs.

TID-17547 OTS $3.60

Veterans Administration Hospital, Hines, Ill.
METABOLISM AND REMOVAL OF RARE EARTHS IN MAN, by Herta Spencer, D. Laszlo, and Betty Rosoff. Rept. on Contract AT(30-1)1763. [1962] 34p. 39 refs.

CHEMISTRY

TID-17559 OTS $1.60

New Hampshire U., Durham.
REACTIONS IN NON-AQUEOUS SOLVENTS, by Helmut M. Haendler. Progress rept. 1 Nov 61-31 Oct 62, on Contract AT(30-1)1964. 1 Nov 62, 15p.

Analytical Chemistry

NASA N63-16885 OTS $4.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
ABUNDANCES OF THE FOURTEEN RARE-EARTH ELEMENTS, SCANDIUM, AND YTTRIUM IN THE SOLAR SYSTEM (IN METEORITIC, TERRESTRIAL, AND SOLAR MATTER) by Larry Haskin, R. A. Schmitt, and R. H. Smith. Rept. on NASA Contracts NASr-75 and NASw-579. 6 Feb 63, 44p. 79 refs. GA-3859; NASA-CR-50119.

NASA N63-16779 OTS $4.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
RARE-EARTH, YTTRIUM, AND SCANDIUM ABUNDANCES IN METEORITIC AND TERRESTRIAL MATTER, by R. A. Schmitt. Quarterly progress rept. no. 3 on NASA Contract NASw-579. 15 May 63, 46p. 44 refs. GA-4221; NASA-CR-50173.

Physical Chemistry

NAA-SR-Memo-615 OTS $1.60

Atomics International, Canoga Park, Calif.
ELECTROMAGNETIC LEVITATION OF URANIUM - THE FREE SUSPENSION OF SOLID AND MOLTEN URANIUM IN SPACE, by P. Gilbert. Rept. on Contract AT(11-1) GEN-18. 2 Mar 53, 11p.

BNL-6583 OTS $1.10

Brookhaven National Lab., Upton, N. Y.
THE Mg-$MgCl_2$ SYSTEM - A CHRONOPOTENTIOMETRIC STUDY, by John D. Van Norman and James J. Egan. Rept. on Contract AT-30-2-GEN-16. [1961] 9p. 7 refs.

BNL-6589 OTS $1.10

Brookhaven National Lab., Upton, N. Y.
THERMODYNAMICS OF FUSED SALT MIXTURES FROM EMF MEASUREMENTS. THE SYSTEMS NaCl-KCl, NaCl-$MgCl_2$, AND NaCl-$CeCl_3$, by James J. Egan and John Bracker. Rept. on Contract AT-30-2-GEN-16. 20 Dec 62, 6p. 2 refs.

HW-75296 OTS $1.10

Hanford Atomic Products Operation, Richland, Wash.
EFFECT OF HEAT TREATMENT ON CLINOPTILOLITE, by K. C. Knoll. Rept. on Contract AT(45-1)1350. 19 Nov 62, 7p. 4 refs.

TID-17666 OTS $1.60

Hebrew U., Jerusalem (Israel)
A STUDY OF LIQUIDS UNDER OPTICAL AND IONIZING EXCITATION WITH EMPHASIS ON EXCITATION IN THE VACUUM ULTRAVIOLET, by A. Weinreb. Annual progress rept. on Contract AT(30-1)2949. 1 Mar 62, 20p.

UCRL-7069 OTS $9.60

Lawrence Radiation Lab., U. of California, Livermore.
HARC AND HEART THROB: COMPUTER PROGRAMS FOR TRANSIENT TEMPERATURE DISTRIBUTIONS AND CHEMICAL REACTIONS IN COMPOSITE SOLIDS, by Arthur L. Edwards. Rept. on Contract W-7405-eng-48. 11 Dec 62, 113p.

TID-17767 OTS $3.60

Metals Research Lab., Carnegie Inst. of Tech., Pittsburgh, Pa.
THE THERMAL CONDUCTIVITY OF INORGANIC MELTS, by W. O. Philbrook. Annual rept. on Contract AT(30-1)2360. 15 Dec 62, 39p. 12 refs.

NYO-6005 OTS $3.60

Princeton U., N. J.
FORMATION OF PLATE-LIKE COLLOIDAL GOLD, by Yuen-shen Chiang and John Turkevich. Rept. on Contract AT(30-1)1301. 1 Jan 63, 38p. 16 refs.

RRL-99 OTS $1.60

Radiation Research Labs., Mellon Inst., Pittsburgh, Pa.
PHOTOLYSIS OF IODOETHANE IN THE GAS PHASE, by Ralph Schindler and M. H. J. Wijnen. Rept. on Contract AT(30-1)2310. 28 Dec 62, 13p. 18 refs.

RRL-95 OTS $2.60

Radiation Research Labs., Mellon Inst., Pittsburgh, Pa.
PHOTOLYSIS OF MIXTURES OF DIETHYL KETONE AND CARBON TETRACHLORIDE, by Jessie E. Gregory and M. H. J. Wijnen. Rept. on Contract AT(30-1)2310. 11 Dec 62, 22p. 21 refs.

RRL-100 OTS $1.60

Radiation Research Labs., Mellon Inst., Pittsburgh, Pa.
RADIATION RESEARCH. Quarterly rept., 1 Oct-31 Dec 62 on Contract AT(30-1)2310. 11 Jan 63, 16p. NYO-10314.

DP-813 OTS $0.50

Savannah River Lab., Aiken, S. C.
THE DIFFUSION OF LITHIUM IN ALUMINUM, by Louis P. Costas. Rept. on Contract AT(07-2)1. Feb 63, 7p. 3 refs. NASA N63-15556.

EARTH SCIENCES

PB 163 276 OTS $4.60

Coast and Geodetic Survey, Washington, D. C.
GEOMAGNETIC REPORT: ANTARCTIC PENINSULA TRAVERSE 1961-1962, by P. J. Wasilewski, [1963] 48p. 1 ref.

DESCRIPTORS: *Scientific research, *Terrestrial magnetism, *Antarctic regions, Scientific personnel, Measuring devices (Electrical and Electronic), Geophysics, Magnetometers.

Since the International Geophysical Year, Sno-Cat Traverse Programs have been conducted in the Antarctic to gather scientific data in a diversity of disciplines--The United States Coast and Geodetic Survey sends a magnetic observer as part of the traverse complement to establish magnetic stations along the traverse route. The observations taken at each magnetic station completely define the magnetic field at that point. This report is intended to give the reader an understanding of Traverse operation.

PB 163 308 OTS $2.60

Institute of Polar Studies, Ohio State U. Research Foundation, Columbus.
GLACIAL GEOLOGY OF OHIO RANGE, CENTRAL HORLICK MOUNTAINS, ANTARCTICA, by John H. Mercer. Rept. no. 8 on Grant G-13590. Apr 63, 22p. 25 refs. RF 1258.

DESCRIPTORS: *Glaciers, Mountains, *Antarctic regions, Ice, Structural geology, Stratigraphy, Geologic age determination, *Geology.

Local glaciers in the Ohio Range of the Central Horlick Mountains have associated ice-cored moraines indicating ice shrinkage, but there is considerable difference in the regime from one glacier to another. The older ice-cored moraines are at least 6000 years B.P. in age. The relative rates of weathering and gravitational transfer of sandstone and diabase boulders suggests that one surface has been free of ice for about 720,000 years. The complete absence of organic matter for absolute dating makes accurate correlation with other areas impossible. Striae, perched boulders, and stranded moraines show that the main Polar Plateau ice surrounding the Ohio Range has been at least 60 m thicker than it is now. This amount is in agreement with the assumed changes of the continental ice sheet caused by its adjustment to a lower sea level whereby there is a large increase in ice thickness at the coast and a smaller increase inland. (Author)

NASA N63-17339 OTS $8.10

New York U. Coll. of Engineering, N. Y.
INTERACTION BETWEEN THE SOLAR WIND AND THE GEOMAGNETIC FIELD, by James Hurley. Project rept. on NASA Grant NsG-108-61; DA-36-0390 sc-87171; ARPA Order 163-61. 1 Mar 61, 82p. 6 refs. NASA CR-50239.

PB 163 116 OTS $7.60

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
SUDDEN COMMENCEMENT VARIATIONS OF GEOMAGNETIC STORMS IN THE ANTARCTIC, by Terou Sato. Scientific rept. no. 2 on Antarctic Research and Data Analysis, Contract NSF-C255. 1 May 63, 76p. 44 refs. Technical rept. RAD-TR-63-8.

DESCRIPTORS: *Magnetic storms, *Antarctic regions, Terrestrial magnetism, Ionospheric disturbances, Electric fields, Electric currents, Distribution, Analysis, Astrophysics, Geophysics.

Sudden commencements (SC) of geomagnetic storms are analyzed for six cases, using magnetograms obtained from Antarctic stations during the International Geophysical Year. The distribution of different types of SC, equivalent current systems and the change with time, are examined and compared with corresponding Northern Hemisphere data; these data are the basis for the discussion of the causes of the complicated SC shapes in high latitudes, especially the cause of the ssc*

PB 163 086 OTS $5.60

Seismological Lab., Calif. Inst. of Tech., Pasadena.
EXCHANGE SCIENTIST WITH THE U.S.S.R. ANTARCTIC EXPEDITION, 1960-61, by Gilbert Dewart Rept. on Grant no. G-9256. [1962] 52p. 8 refs.

DESCRIPTORS: *Scientific personnel, *Scientific research, *Antarctic regions, Buildings, Logistics, Transportation, Seismological stations, Geophysical prospecting, Astronomical geodesics, Measuring devices (Electrical and Electronic), Data, *Geophysics.

The California Institute of Technology presented a plan for sending an American geophysicist to take part in the earth sciences program of the 5th Soviet Antarctic Expedition, 1960-61. His duties were to include routine observations and research at the Mirny seismograph station and participation in the seismic, gravimetric and magnetic investigations conducted on the Soviet traverse operations. This proposal was accepted.

Climatology and Meteorology

AD-283 102 OTS $7.60

Marine Lab., U. of Miami, Coral Gables, Fla.
EVALUATION AND APPLICATION OF A SPECIAL WEATHER RADAR RECEIVER SYSTEM, by H. W. Hiser, P. E. Norman, and C. E. Steen. Final rept. 22 Dec 60-19 Feb 62, on Contract NOw-61-0246-d. Mar 62, 78p. 12 refs. Rept. no. 8888-4; Rept. no. ML 62255.

DESCRIPTORS: *Meteorological radar, *Radar reflections, Tornadoes, Radar equipment, Display systems, Range finding, Calibration, Plan-position indicators, Frequency stabilizers, Radar receivers, Precipitation.

This report covers the evaluation of a specially designed radar receiver system for research and operational use in the field of meteorology. Numerous second and third-generation modifications and improvements in the SP-1M radar system are described, which were necessary to fully utilize the new receiver system. Several modernizations and improvements in the model CR-2 radarscope cameras are also presented. Results of a two-year study of precipitation echo heights in the South Florida region are summarized.

PB 163 319 OTS $4.60

National Severe Storms Project, Kansas City, Mo.
DYNAMICS OF SEVERE CONVECTION STORMS, by Chester W. Newton. July 62, 49p. 110 refs. Rept. no. 9; NASA N63-10209.

DESCRIPTORS: *Storms, *Thunderstorms, *Convection, Dynamics, Atmospheric motion, *Air mass analysis, Tracking, *Clouds, Barometric pressure.

This review outlines in very broad and qualitative terms, the processes thought to be relevant to the storm as a motion system.

PB 163 254 OTS $1.60

New York U. Coll. of Engineering, N. Y.
THE DEVELOPMENT OF AN OBSERVATIONAL SYSTEM FOR TURBULENT WIND, TEMPERATURE AND HUMIDITY MEASUREMENTS OVER COASTAL WATERS, by Joseph Pandolfo. Rept. on National Science Foundation Grant NSF G-11105. Oct 62, 18p. 13 refs.

DESCRIPTORS: *Meteorological instruments, Measurement, *Meteorological parameters, Beaches, Water, Anemometers, Thermocouples, Hygrometers, *Marine meteorology, Design, Operation, Meteorology.

An observational system for turbulent wind measurements over shallow water is described. The instrument platform is a bottom based tower with an attached float for any necessary auxiliary electronic equipment. The sensing elements are bivanes, heated thermocouple anemometers and thermocouple psychrometers. Sensor outputs are converted to frequency-modulated signals which are transmitted to a control and recording center by cable. The recording is on a professional quality audio magnetic tape recorder. Some of the faults in the system exhibited during field tests are described, but precise evaluation of system performance was prevented by failure to record the time reference signal satisfactorily. (Author)

NASA N63-17139 OTS $1.60

Stanford Research Inst., Menlo Park, Calif.
FREQUENCY DISTRIBUTIONS OF SHOWER SIZES, by A. S. Dennis and F. G. Fernald. Rept. on NASA Contract NASr-49(06). [1963] 14p. 5 refs. NASA-CR-50172.

NASA N63-17335 OTS $9.10

Stanford Research Inst., Menlo Park, Calif.
RAINFALL DETERMINATIONS BY METEOROLOGICAL SATELLITE RADAR, by Arnett S. Dennis. Final rept. on NASA Contract NASr-49(06). Apr 63, 110p. 83 refs. SRI Proj. 4080; NASA CR-50193.

Geology

PB 163 277 OTS $7.60

Bureau of Mines, Washington, D. C.
MOUNT GRAN COAL DEPOSITS, VICTORIA LAND, ANTARCTICA, by John J. Mulligan and others. 1963, 74p. 26 refs. Rept. on Investigations 6218.

DESCRIPTORS: *Coal, Deposits, *Antarctic regions, *Economic geology, Geological survey, Petrology, Chemical properties, Physical properties, Chemical analysis.

NASA N63-16720 OTS $2.60

California U., La Jolla.
THE UREY-CRAIG GROUPS OF CHONDRITES AND THEIR STATES OF OXIDATION, by Hans E. Suess. Rept. on NASA Contract NsG-322-63. 1963, 27p. 32 refs. NASA CR-50011.

NASA N63-15933 OTS $1.10

California U., La Jolla. School of Science and Engineering.
ON A POSSIBLE CORRELATION BETWEEN CLASSIFICATIONS AND K-A AGES OF CHONDRITES, by Klaus Keil. Rept. on NASA Grant NsG-322-63. [1963] 8p. 19 refs.

PB 163 059 OTS $6.60

Geological Survey, Washington, D. C.
ASTROGEOLOGIC STUDIES. Semiannual progress rept. 26 Feb-24 Aug 61. Mar 62, 64p. 87 refs.

DESCRIPTORS: *Astrophysics, *Geology, *Meteorites, *Craters, *Obsidian, Petrology, Phase studies, *Extraterrestrial topography, *Moon, Mapping.

Contents:
Extraterrestrial material
Crater investigations
Geologic mapping of the moon

TID-18002 OTS $21.00

Lamont Geological Observatory, Columbia U., Palisades, N. Y.
INVESTIGATIONS IN ISOTOPIC GEOCHEMISTRY, by J. Laurence Kulp, E. J. Catanzaro and others. Annual progress rept. no. 8. Rept. on Contract AT(30-1)1669. 31 Jan 63, 359p. 148 refs.

Oceanography

NYO-10300 OTS $1.60

Lamont Geological Observatory, Columbia U., Palisades, N. Y.
CIRCULATION OF OCEANIC WATERS, by Robert D. Gerard. Final rept. on Contract AT(30-1) 1808. Apr 62, 15p. 9 refs.

TID-17671 OTS $9.10

Washington U., Seattle.
THE COLUMBIA RIVER DISCHARGE AREA OF THE NORTH-EAST PACIFIC OCEAN, by George C. Anderson, Clifford A. Barnes and others. A literature survey. Rept. on Contract AT(45-1)1385. July 61, 104p. Ref. M61-25.

Physics of the Atmosphere

NASA N63-16672 OTS $1.60

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
CHARGED PARTICLE REACTIONS OF IMPORTANCE IN THE IONOSPHERE, by A. C. Aikin. 1 Aug 62, 18p. 16 refs. NASA X-615-62-132; NASA TM X-50029.

NASA N63-17104 OTS $2.60

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
ELECTRON LOSS RATE FROM THE OUTER RADIATION BELT, by S. Bloom, L. Mann, F. Seward, and others. 1962, 21p. 18 refs. NASA TM X-50017; NASA X-640-62-38.

ENGINEERING

PB 163 371 OTS $17.00

Andersen, Arthur, and Co., Chicago, Ill.
REPORT ON SURVEY AND ANALYSIS OF DIFFERENCES BETWEEN U. S. NAVY SHIPBUILDING COSTS AT NAVAL AND PRIVATE SHIPYARDS. Rept. on Shipbuilding Cost Study, Contract NObs-4577. 30 Nov 62, 262p.

DESCRIPTORS: *Naval vessels (Combatant), Naval vessels (Support), Construction, Maintenance, *Costs, Analysis, Labor, *Shipyards.

On the basis of review and analysis of construction costs for 24 ships, it is concluded that 5 private shipyards built 14 of these ships at less cost to the Government and to the Department of Defense than the comparable 10 ships built by 6 Naval shipyards.

OTS SB-514 OTS $0.10

Office of Technical Services, Dept. of Commerce Washington, D. C.
ENGINEERED PERFORMANCE STANDARDS. July 63, 2p. 29 refs. OTS Selective Bibliography SB-514.

DESCRIPTORS: *Bibliographies, Handbooks, *Operations research, Engineers, Maintenance personnel, *Job analysis, *Standards.

Lists 29 engineered performance standards developed by U. S. Navy Bureau of Yards and Docks engineers for all crafts in public works maintenance. The standards (handbooks and formulas) are based on a detailed analysis of the work required in building maintenance, machine repair and related work in a variety of trades at Navy installations. Each step in a given job is laid out in detail; publications can thus be used for planning and estimating a wide range of jobs in maintenance, repair, or construction. (Author)

Civil Engineering

PB 163 155 OTS $2.60

Queen's U., Kingston (Canada).
SHEAR LAG IN BEAM AND SLAB COMBINATIONS, by J. A. N. Lee. Apr 63, 25p. 5 refs. C.E. research rept. no. 30.

DESCRIPTORS: *Structures, *Beams (Structural), Sheets, *Shear stresses, *Load distribution, Civil engineering, Mathematical analysis, Structural properties.

This report is an amplification of the mathematical derivation for the theory of stresses in Tee-beams originally published as : "The Effective Width of Tee-beams" The Structural Engineer V. XL. No. 1. January 1962, by J. A. N. Lee.

PB 163 269 OTS $11.50

Stanford U., Calif.
HYDRODYNAMICS OF FLOW INTO CURB-OPENING INLETS, by Richard J. Wasley. Technical rept. no. 6 on Contract CPR 11-7623. Nov 60, 154p. 23 refs.

DESCRIPTORS: Roads, Drainage, Hydraulic research, Fluid mechanics, *Hydrodynamics, Theory, Civil engineering.

A theoretical analysis and experimental investigation of the hydrodynamic problem associated with the curb-opening inlet is presented. The goal is to provide information to aid in the rational design of highway inlets. The channel (or gutter) considered in triangular in cross-section with one side nearly vertical, placed on a continuous grade with no depression in the channel bottom. At a certain distance from the upper end sufficient to establish uniform flow condition, the vertical side terminates abruptly; this marks the beginning of the section under study. The length of the opening is sufficient to allow all the flow to pass over the inlet lip. Slopes greater than the critical are investigated analytically and experimentally; some data on flows in or very near the subcritical regime are also obtained.

Electrical and Electronic Engineering

PB 163 316 OTS $1.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
THE EVALUATION OF A SECTIONALIZED SHIELDED ENCLOSURE, by Liborio J. Castriota, Horace Vasques, and Leonard Schwartz. Rept. on Contract AF 28(099)8. 11 July 52, 17p. 3 refs. Rept. R-275-52; PIB 214; ATI-170 716.

DESCRIPTORS: *Electronics laboratories, *Noise (Radio), Inhibition, *Electromagnetic shielding, *Filters (Electromagnetic wave), Attenuation, Tests.

This report includes a discussion and comparison of existing methods used to obtain the shielding efficiency of cell type screen rooms. The methods discussed include the, "door open-door closed", "inside-outside", and the "uniform field method".

PB 163 384 OTS $4.60

Naval Research Lab., Washington, D. C.
RESOLUTION CAPABILITIES OF CATHODE-RAY TUBES 10BP4, 10FP4, AND 16AP4, by M. F. Hodges. 30 Nov 50, 45p. 10 refs. NRL rept. 3772.

DESCRIPTORS: *Cathode ray tubes, *Resolution, Effectiveness, Determination, Measurement, Brightness, Electronics, Optics, Television display systems

The resolution capability of each of three types of c-r tubes, namely, types 10BP4, 10FP4, and 16AP4, has been determined by a simple technique to be in the order of 125 lines per inch. Factors influencing such determination including viewing distance, ambient lighting, tube operating potentials, and brightness contrast are discussed. Light output comparisons for equal power and signal input to the three tubes show maximum light output from the type 10FP4. (Author)

PB 163 383 OTS $2.60

Navy Electronics Lab., San Diego, Calif.
STUDY OF NORTH ATLANTIC VLF TRANSMITTING STATION, by W. E. Gustafson, T. E. Devaney, and A. N. Smith. 22 June 59, 29p. 10 refs. NEL rept. no. 909.

DESCRIPTORS: *Very low frequency, Radio communication systems, Model tests, *Antennas.

The Developmental Engineering Corporation design for the North Atlantic VLF Antenna System was evaluated using theory and model studies. The following engineering estimates were obtained: (1) antenna efficiency, 48 per cent in the winter and 58 per cent in the summer; (2) antenna Q, 315 in the winter and 375 in the summer. It was recommended that the contractor's electrical design be adopted (the structural design was not evaluated by the Laboratory). (Author)

PB 163 324 OTS $13.50

RCA Defense Electronic Products, Camden, N. J.
MICRO-MODULE PRODUCTION PROGRAM. Quarterly rept. no. 2, 1 July-1 Oct 58, on Contract DA 36-039-sc-75968. [1958] 195p. AD-211 579.

DESCRIPTORS: *Microminiaturization (Electronics), Production, *Electronic circuits, Subminiature electronic equipment, Radio equipment, Capacitors, Resistors, Semiconductors, Quartz, Crystal oscillators, Crystal units, Tuned circuits, Digital systems, Reliability (Electronics), Electronic equipment.

The accomplishments during the Second Quarter have been highly significant in the effort to achieve the goals of the Micro-Module Program. Major strides have been made in the establishment and refinement of the system design including the establishment of standards for the first generation of micro-modules and basic methods of construction of assemblies and equipments from these modules. Important advances were made in the area of application of materials, particularly in ferrites and thin dielectric films. In addition, preliminary micro-elements of all basic types were built and preliminary modules of several types were constructed. All significant limited-scope subcontracts were let during this quarter.

PB 163 326 OTS $16.50

RCA Defense Electronic Products, Camden, N. J.
MICRO-MODULE PRODUCTION PROGRAM. Quarterly rept. no. 3, 1 Oct 58-1 Jan 59, on Contract DA 36-039-sc-75968. [1959] 256p. AD-214 176

DESCRIPTORS: *Microminiaturization (Electronics), Production, *Electronic circuits, Subminiature electronic equipment, Radio equipment, Capacitors, Resistors, Semiconductors, Quartz, Diodes, Tuned circuits, Digital systems, Multiplex, Reliability (Electronics), Electronic equipment.

The wafer design has been standardized for modules under the present program. The set of initial general standards for preferred dimensions and layout established has been used successfully. Evaluation of various micro-wafer materials continued, including alumina, Fotoceram, and beryllia. An evaluation of hermetic sealing techniques for transistors was carried out, with a resultant indication that a hot-sealing process would be employed as the basic sealing technique. All of the resistors, capacitors, and inductors required for the 16 preliminary modules were successfully designed and constructed. A number of preliminary diode samples were evaluated and subjected to life testing, and satisfied the requirements. (See also PB 163 324)

PB 163 325 OTS $15.50

RCA Defense Electronic Products, Camden, N. J.
MICRO-MODULE PRODUCTION PROGRAM. Quarterly rept. no. 4, 1 Jan-1 Apr 59, on Contract DA 36-039-sc-75968. [1959] 238p. AD-220 823.

DESCRIPTORS: *Microminiaturization (Electronics), Production, *Electronic circuits, Subminiature electronic equipment, Radio equipment, Radio receivers, Capacitors, Resistors, Semiconductors, Crystal units, Tuned circuits, Digital systems, Encapsulation, Heat transfer, Reliability (Electronics), Electronic equipment.

Major achievements of this quarter have included a demonstration of micromodular receivers at the Progress Report at Washington, D. C., heat transfer studies, crystal micro-element fabrication and the electric tuning task. (See also PB 163 326)

TID-17614 OTS $2.60

Sandia Corp., Livermore, Calif.
THE DETERMINATION OF ACCURACY OF A RANDOM NOISE EQUALIZATION SYSTEM FOR AN ELECTRODYNAMIC EXCITER, by D. F. Hillyer. Rept. on Contract AT(29-1)789. Dec 62, 23p. 2 refs. SCDC-2036.

PB 163 152 OTS $5.60

Sea Water Conversion Lab., U. of California, Richmond.
SALINE WATER CONVERSION RESEARCH. Berkeley progress rept., 1 July-31 Dec 62, Feb 63, 58p. 13 refs. Rept. no. 63-3.

DESCRIPTORS: *Sea water, *Desalination, Scientific research, *Evaporators, *Heat exchangers, *Electrodialysis, *Distilling plants, Design, Operation, Ion exchange, Fog, *Solar furnaces, Foils, Copper, Atmospheric pressure, Freezing, Separation, Carbon dioxide, Solubility.

Multiple-effect rotating evaporator
Sea water evaporation by immiscible liquid heat transfer electrodialysis
Use of high temperatures in thermal distillation
Vacuum-flash distillation utilizing low-temperature differences
Solar and atmospheric distillation
Freeze separation

PB 163 327 OTS $5.60

Army [Missile Command] Redstone Arsenal, Ala.
CONTROL-FEEDBACK STABILITY ANALYSIS, by Mario H. Rheinfurth. 11 Jan 60, 60p. 8 refs. Rept. no. DA-TR-2-60; AD-232 447.

DESCRIPTORS: *Guided missiles, *Stability, Flutter, Vibration, Yaw, *Dynamics, Instrumentation, Mathematical analysis, Propellant tanks, Liquid rocket propellants, Fluid mechanics.

A control-feedback stability analysis of guided missiles is presented. The equations of motion are derived by reducing the continuous system of the missile airframe to a finite degree of freedom system. Since additional unknown variables are introduced by the control system and its sensing elements, the equations of motion have to be supplemented by equations relating the output of the sensing elements and the control deflection of the swivel engine or rudders. The stability analysis is limited to the pitch and yaw plane.

NASA N63-17211 OTS $8.10

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
CATALOGUE OF SATELLITE OBSERVATIONS NO. C-32, by Beatrice Miller. Rept. on NASA Grant NsG-87-60. 29 Jan 63, 82p. SAO Special rept. 115.

AD-287 424 OTS $1.60

Bureau of Mines, Pittsburgh, Pa.
INITIATION OF DETONATION RESULTING FROM COMBUSTION INSTABILITIES, by F. C. Gibson, C. R. Summers, and F. H. Scott. Quarterly rept., 1 May-31 July 62. 17 Oct 62, 19p. 10 refs. ARPA Order no. 44-62; NASA N62-17460.

DESCRIPTORS: *Explosive materials, *Explosive initiators, Detonations, Combustion, Stability, Nitroglycerin, Temperature, Nitro radicals, Glycols, Methane, Pressure, Shock (Mechanics), Detonation waves.

In an attempt to extend the existing theory of initiation of homogeneous explosives, and experimental investigation has been undertaken to study the shock initiation of nitroglycerin-nitroglycol (NG-EGDN, 50/50 by weight) as a function of initial temperature. It has been shown that the delay to initiation in the shock ignition of nitromethane is a sensitive function of initial temperature. Furthermore, if the thermal initiation model proposed by Hubbard and Johnson is correct, the peak pressure required to produce detonation should also depend on the initial temperature. To date, no comprehensive program is this area has been carried out. These experiments should also yield measurements relative to the shock Hugoniot of NG-EGDN on which no information is available. (Author)

AD-293 987 OTS $2.60

Bureau of Mines, Pittsburgh, Pa.
INITIATION OF DETONATION RESULTING FROM COMBUSTION INSTABILITIES, by F. C. Gibson, R. W. Watson and others. Quarterly rept., 1 Aug-31 Oct 62. 9 Jan 63, 21p. 3 refs. ARPA Order no. 44-62; NASA N63-11757.

DESCRIPTORS: *Explosive materials, *Explosive initiators, *Detonations, Combustion, Stability, Shock (Mechanics), Pressure, High speed photography, Velocity, Calibration.

The experimental investigation to determine the minimum shock pressure required to produce a high order detonation in NG-EGDN as a function of initial temperature has been continued. The initial phase of this program was carried out with a shock donor system consisting of a 3/4 inch diameter by 1/4-inch thick tetryl pellet used in conjunction with shock attenuator plates of 2024-T3 aluminum having thicknesses of 1/16 inch, 1/8 inch, or 1/4 inch. The magnitude of the pressure pulse delivered to the explosive is determined from initial shock velocity measurements together with appropriate calibration data obtained by the water-aquarium technique. The shock velocities are obtained from streak camera records of the shock front as it enters the liquid; other aspects of the tests are recorded simultaneously by means of a high speed framing camera. The preliminary studies carried out at ambient temperature (25°C) led to the conclusion that peak pressures of the order of 60 kilobars were inadequate for the direct initiation of a high order detonation in NG-EGDN experiments. These results have been extended to include trials at 50°C and 75°C. In addition, data has been obtained at both ambient and elevated temperatures using a 1-5/8 inch diameter x 1/2-inch thick tetryl donor and 1/16-inch and 1/8-inch thick attenuator plates. (Author) (See also AD-287 424)

PB 163 379 OTS $1.60

Bureau of [Naval Weapons] Washington, D. C.
PAINTING OF NAVAL ORDNANCE EQUIPMENT. 7 July 55, rev. 10 Feb 58, 15p. Rept. no. NAVORD OSTD 52, rev. 20.

DESCRIPTORS: Instruction manuals, *Paints, Paint applicators, *Ordnance, *Naval equipment, Maintenance, Finishes and finishing.

This publication is intended for use as a general guide in identifying the designations of painting materials and processes shown on drawings and other documents. When so used, reference must be made to the particular paint systems and processes described herein. (Author)

NASA N63-17214 OTS $3.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
DIRECT-ASCENT vs. PARKING-ORBIT TRAJECTORY FOR LUNAR-SOFT-LANDING MISSIONS, by T. F. Gautschi and V. C. Clarke, Jr. Rept. on Contract NAS7-100. 3 Dec 62, 38p. refs. JPL-TM-33-114; NASA CR-50064.

NASA N63-16724 OTS $5.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
ESTIMATED 1963-1970 CAPABILITY OF THE DEEP SPACE INSTRUMENTATION FACILITY FOR APOLLO PROJECT, by E. Rechtin. Rept. on NASA Contract NAS7-100. 1 Feb 62, 54p. 8 refs. EPD-29, Rev. 1; NASA CR-50001.

NASA N63-15931 OTS $4.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
FRICTION MEASUREMENTS ON A LOW EARTH SATELLITE, by J. B. Rittenhouse, L. D. Jaffe, and others. Rept. on NASA Contract NAS7-100. 15 Apr 63, 46p. 16 refs. JPL-TR-32-402.

NASA N63-16558 OTS $3.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
JET PROPULSION LABORATORY LUNAR PROGRAM GUIDELINES, by C. I. Cummings. Rept. on NASA Contract NAS7-100. 15 Aug 62, 34p. JPL-EPD-22; NASA CR 50076.

NASA N63-16155 OTS $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A SPACE MECHANISM FOR LIMITED PARALLEL MOTION, by A. C. Dunk. Rept. on NASA Contract NAS7-100. 14 Dec 62, 17p. 4 refs. JPL-TM-33-106.

NASA N63-16173 OTS $15.50

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-20, VOLUME IV FOR THE PERIOD FEBRUARY 1, 1963 to MARCH 31, 1963, SUPPORTING RESEARCH AND ADVANCED DEVELOPMENT. Rept. on NASA Contract NAS7-100. 30 Apr 63, 235p. 165 refs.

NASA N63-14679 OTS $11.50

Lockheed Aircraft Corp., Sunnyvale, Calif.
A STUDY OF INTERPLANETARY TRANSPORTATION SYSTEMS, by S. Ross. Final rept. on NASA Contract NAS8-2469. 2 June 62, 156p. refs. Rept. 3-17-62-1.

NASA N63-16987 OTS $3.00

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
ASCENT FROM THE LUNAR SURFACE, by Rowland E. Burns and Larry G. Singleton. June 63, 155p. 5 refs. NASA TN D-1644.

PB 163 306 OTS $3.60

Naval Ordnance Lab., White Oak, Md.
THEORETICAL CALCULATIONS ON THE SHOCK INITATION OF SOLID EXPLOSIVES, by Julius W. Enig and Fred T. Metcalf. 24 Aug 62, 34p. 25 refs. Rept. no. NOLTR 62-160; NASA N63-11688.

DESCRIPTORS: *Explosive materials, *TNT, *RDX, *Tetryl, *Pentolite, *Sensitivity, *Explosive initiators, *Detonation waves, *Shock waves, Distribution, Motion, Velocity, Equations of state.

Theoretical calculations describing the initiation in heterogeneous TNT, RDX, Tetryl, Comp B, Pentolite, and 75/25 Cyclotol, produced by shocks up to 37 kilobars, are given. The "hot spot" initiation mechanism is simulated by using appropriate equations of state of the explosives and the resultant growth from shock to detonation wave is shown to be in qualitative agreement with experimental results. The shock wave in the explosive travels with increasing velocity due to the release of energy during chemical reaction in the neighborhood of the shock front, and then takes on a constant value upon reaching full detonation velocity. Numerical experiments show that the qualitative ordering of the sensitivity of the 6 explosives, based on one-dimensional gap test calculations, is the same as that obtained from the U. S. Naval Ordnance Laboratory experimental gap tests. (Author)

PB 163 373 OTS $6.60

Systems Technology, Inc. [Inglewood, Calif.].
A STUDY OF THE TWO BASIC APPROXIMATIONS IN THE IMPULSIVE GUIDANCE TECHNIQUES FOR ORBITAL RENDEZVOUS, by Robert L. Stapleford. Rept. on stability and Control Investigations, Contract AF 33(616)7094. July 62, 66p. 8 refs. ASD-TDR-62-83.

DESCRIPTORS: Numerical analysis, Equations, Guidance, *Rendezvous guidance, Velocity, *Flight control systems, Space probes, *Thrust, Specific impulse, *Intercept trajectories, Rendezvous spacecraft.

The impulsive guidance techniques which have been proposed for orbital rendezvous are based on two fundamental approximations: first, the equations for the relative motion between the target and the interceptor are approximated by a set of linear equations; and second, the velocity corrections or changes are considered to be impulsive, or instantaneous. The errors introduced by these two approximations are investigated in this report. An analytical study of the accuracy of the approximate equations for three slightly different coordinate systems is conducted to determine the errors for each set of coordinates and the relative merits of each set. Analytical expressions for the errors for certain specific situations are developed; these expressions give some indication of the relative worth of the various coordinates. Approximate solutions for the errors due to a finite burning time are derived, and an iterative scheme for two-burst guidance, which takes these effects into account, is developed. Three examples of the use of the iterative technique are shown. (Author)

NASA N63-16219 OTS $19.75

Westinghouse Electric Corp., Lima, Ohio.
SPACE ELECTRIC POWER SYSTEMS STUDY, by F. C. Stump. Quarterly progress rept. no. 1, 8 Nov 61-8 Feb 62, on NASA Contract NAS5-1234. [1962] 312p. 6 refs.

Sanitation and Safety Engineering

BNL-6538 OTS $2.60

Brookhaven National Lab., Upton, N. Y.
THE STATUS OF METEOROLOGICAL KNOWLEDGE AS A FACTOR IN AIR POLLUTION CONTROL, by Maynard E. Smith. Rept. on Contract AT-30-2-GEN-16. 1962. 21p. 56 refs.

HW-64154 OTS $1.60

Hanford Atomic Products Operation, Richland, Wash.
100-N DECONTAMINATION FACILITY DESIGN GUIDE, by W. D. Bainard. Rept. on Contract AT(45-1)1350. 8 Mar 60, 13p. 10 refs.

DP-820 OTS $0.50

Savannah River Lab., Aiken, S. C.
AUTOMATIC CRANE CUTOFF DEVICE, by Whitefield F. Woodhead. Rept. on Contract AT(07-2)1. Feb 63, 13p. 1 ref. NASA N63-15409.

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

PB 163 376 OTS $13.50

Missile Div., Chrysler Corp., Detroit, Mich.
GAS LUBRICATED BEARINGS FOR ADVANCED SYSTEMS ELECTRICAL ACCESSORY EQUIPMENT, by R. D. McKenna, D. O. Bard, and J. G. Gievers. Final rept., 1 Feb 61-31 Mar 62, on Power Conversion and Transmission Technology, Contract AF 33(616)7919. Sep 62, 193p. ASD-TDR-62-170.

DESCRIPTORS: *Journal bearings, Bearings, Lubrication, Lubricants, Electrical equipment, Gas bearings, Manufacturing methods, Test methods, Test equipment, Design, Experimental data, Analysis.

This technical report contains design criteria, fabrication techniques and an analysis of experimental test data for 1-inch bore pneumostatic gas-lubricated journal bearings. (Author)

Engines and Propulsion Systems

NASA N63-16440 OTS $3.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE STRUCTURAL DYNAMIC BEHAVIOR OF A TANK-MOUNTED LIQUID-PROPELLANT ROCKET ENGINE, by T. E. Lang. Rept. on NASA Contract NASw-6, 8 Dec 61, 31p. 10 refs. JPL TR-32-194.

NASA N63-16676 OTS $11.00

Wright Aeronautical Div., Curtiss-Wright Corp., Wood-Ridge, N. J.
INVESTIGATION OF FEASIBILITY OF A POSITIVE DISPLACEMENT INJECTOR FOR ATTITUDE CONTROL PROPULSION, by D. L. Ryan and G. Kelley. Final rept., Sep 62-Jan 63, on NASA Contract NAS7-185. Jan 63, 147p. 8 refs. CTR.00-270; NASA CR-50043.

Manufacturing Equipment and Processes

PB 163 252 OTS $3.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
PREVENTIVE MAINTENANCE SCHEDULING BY MATHEMATICAL PROGRAMMING, by Harvey M. Wagner and R. George Glaser. Technical rept. no. 1, on National Science Foundation Grant 24064. 9 Jan 63, 31p. 1 ref.

DESCRIPTORS: *Maintenance, *Scheduling, *Programming (Computers), Models (Simulations), Maintenance personnel, Management engineering.

The task of scheduling preventive (that is, routine or planned) maintenance involves specifying dates at which manpower is to be allocated to an overhaul of a major functional element or group of elements. Several mathematical programming models are described that attempt to perform the scheduling operations so as to meet the aforementioned objective. Specifically the models are integer linear programs.

ORNL-TM-98 OTS $7.60

Oak Ridge National Lab., Tenn.
THE WELDING OF FERRITIC STEELS TO AUSTENITIC STAINLESS STEELS, by G. M. Slaughter and T. R. Housley. Rept. on Contract W7405-eng-26. 4 Jan 62, 80p. 25 refs.

MATERIALS

PB 163 317 OTS $1.60

Stanford Research Inst., Menlo Park, Calif.
ENCAPSULATED AEROSOLS, by Robert C. Robbins. Quarterly progress rept. no. 2, 1 July-30 Sep 60, on Contract DA 18-108-405-cml-746. 31 Oct 60, 12p. SRI Proj. SU-3191; AD-245 836.

DESCRIPTORS: *Chemical warfare agents, *Aerosols, *Phthalates, Octyl radicals, *Phosphates, Cresyl radicals, *Phosphoric acids, *Encapsulation, Coatings, Fatty acids, *Stearic acids, *Ammonium compounds, Chlorides, Coagulation, Static electricity.

Three encapsulated aerosols were produced in good yield by the condensation method: lauric acid on dioctyl phthalate, lauric acid on tricresyl phosphate, and ammonium chloride on tricresyl phosphate. Examples of a nonwetting combination, ammonium chloride and clay, and of an inverting combination, ammonium chloride and phosphoric acid, were encountered in systems

in which all of the requirements except that of correct surface properties were met. Simple coagulation of the stearic acid-phosphoric acid system was investigated. The deposition of a fairly large fraction of the stearic acid droplets on the phosphoric acid was observed. Electrical charging of the aerosols in this system did not greatly increase the process of heterocoagulation. The original charging cell design was very inefficient, and an improved design will be used in future electrical charging studies. (Author) (See also PB 163 082)

PB 163 318 OTS $1.60

Stanford Research Inst., Menlo Park, Calif.
ENCAPSULATED AEROSOLS, by Robert C. Robbins. Quarterly progress rept. no. 3, 1 Oct-31 Dec 60, on Contract DA 18-108-405-cml-746. 30 Jan 61, 18p. SRI Proj. SU-3191; AD-250 825.

DESCRIPTORS: *Chemical warfare agents, *Aerosols, Glass, Waxes, Talic, Phosphates, Hydrogen compounds, Methyl radicals, Oxychlorides, Phosphorus compounds, Benzenes, *Encapsulation, Coatings, *Glycols, Ethylenes, *Phosphoric acids, *Phosphites, Butyl radicals, Polymers, *Plastic films, *Styrene plastics, *Polyethylene plastics, Ventri tubes, Turbulent flow, Coagulation, Static electricity.

Methods were explored for the polymer encapsulation of aerosols by the use of inertial or electrostatic forces to promote coagulation between polymer solution droplets and core particles, followed by volatilization of the solvent. While the extent of induced heterocoagulation was fair upon application of inertial forces and excellent upon application of electrostatic forces, no coherent polymer films formed in any of the systems studied. Other encapsulated aerosol systems which did not require formation of a polymer film responded very well to this approach. A number of successful aerosol encapsulations were made with the aid of electrostatic forces. In liquid dispersions, polymer microencapsulation was achieved with excellent efficiency by using an emulsion spraying technique. (Author) (See also PB 163 317)

Ceramics and Refractories

TID-17776 OTS $2.60

Argonne National Lab., Ill.
A REVIEW OF SOME GAMMA RADIATION EFFECTS ON GLASS, by Adli M. Bishay. Rept. on Contract W31-109-eng-38. Oct 62, 27p. 19 refs. UAC-7008.

BBC-113 OTS $2.60

Brush Beryllium Co., Cleveland, Ohio.
DEVELOPMENT OF INTERMETALLIC COMPOUNDS FOR VERY HIGH TEMPERATURE APPLICATIONS, by R. M. Paine, A. J. Stonehouse, and W. W. Beaver. Quarterly progress rept., 1 Jan-31 Mar 62, on Contract At(33-3)20. 31 May 62, 30p.

Fuels, Lubricants, and Hydraulic Fluids

NASA N63-16988 OTS $0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
PRELIMINARY EXPERIMENTAL INVESTIGATION OF FREQUENCIES AND FORCES RESULTING FROM LIQUID SLOSHING IN TOROIDAL TANKS, by Irving E. Sumner. June 63, 18p. 8 refs. NASA TN D-1709.

NASA N63-16673 OTS $2.60

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
DISCREPANCIES WITH Δp SENSORS FOR MONITORING LIQUID PROPELLANT SLOSHING DURING ROCKET FLIGHT, by Werner R. Eulitz. 10 Aug 62, 29p. 3 refs. MTP-P&VE-P-62-6; NASA TM X-50026.

PB 163 375 OTS $10.50

Rocketdyne, Canoga Park, Calif.
DETERMINATION OF WORKING FLUID LUBRICATION CAPABILITY IN JOURNAL BEARINGS, by J. Hall, R. S. Siegler and others. Rept. on Aerospace Lubricants, Contract AF 33(616)8328. Dec 62, 133p. 11 refs. ASD-TDR-62-640.

DESCRIPTORS: *Journal bearings, Bearings, *Lubrication, *Lubricants, *Potassium, *Rubidium, Effectiveness, Test equipment, Design, Tests, Liquid metals, Alkali metals.

A research program was conducted on lubrication of journal bearings by the liquid-alkali metals, potassium and rubidium. The objective of the program was a 1500-hour endurance run on each fluid at speeds up to 36,000 rpm, loads up to 100 lb, and lubricant temperatures up to 1200 F. Preliminary performance studies were conducted on two bearing designs using water as the lubricant. This was done to determine expected performance of the selected bearing designs when subjected to the alkali metal lubrication. Potassium lubricated bearing studies were conducted at selected operating conditions of speed, load, lubricant flow, and lubricant temperature. Results of preliminary data were compared with calculated values. Differences between measured and calculated values of variables were greater than expected. A rubidium lubricated bearing facility was designed and constructed whose principal components were a liquid-metal supply loop and a rig especially designed for long duration lubrication investigations. A closed cycle gas system designed to provide turbine and support bearing operating gas for both liquid-metal systems was constructed; it operated at design temperatures. (Author)

NASA N63-17125 OTS $1.60

Southwest Research Inst., San Antonio, Tex.
STUDIES OF LIQUID DYNAMICS IN ROCKET PROPELLANT TANKS, by H. Norman Abramson. Final rept., 28 Mar 60-31 May 63, on NASA Contract NASw-146. 15 May 63, 15p. NASA-CR-50258.

MATHEMATICS

TID-17654 OTS $1.60

Argonne National Lab., Ill.
NUMERICAL INTEGRATION AND DIFFERENTIATION OF FUNCTIONS OF SEVERAL INDEPENDENT VARIABLES BY AN ITERATIVE PROCEDURE, by Henry C. Thacher, Jr. Rept. on Contract W-31-109-eng-38. Oct 62, 15p. 7 refs. UAC-6924.

NYO-9760 OTS $4.60

Courant Inst. of Mathematical Sciences, New York U., N. Y.
A FINITE DIFFERENCE SCHEME FOR THE NEUMANN AND THE DIRICHLET PROBLEM, by K. O. Friedrichs. Rept. on Contract AT(30-1)1480. 8 Aug 62, 43p. 3 refs. NASA N63-11491.

TID-16821 OTS $12.00

Digital Computer Lab., U. of Illinois, Urbana.
A STUDY OF ARITHMETIC RECODING WITH APPLICATIONS IN MULTIPLICATION AND DIVISION, by J. O. Penhollow. Rept. on Contract AT(11-1)415. 10 Sep 62, 170p. 15 refs. Rept. no. 128.

HW-73057 OTS $1.60

Hanford Atomic Products Operation, Richland, Wash.
ON THE PACKING OF SPHERES FOR MAXIMUM DENSITY, by R. L. Richardson. Rept. on Contract AT(45-1)1350. 25 July 61, 12p.

TID-17656 OTS $4.60

Phillips Petroleum Co., Idaho Falls.
STATISTICS OF MEASUREMENT, by Fred H. Tingey. Rept. on Contract AT(10-1)205. [1962] 46p. 9 refs.

Computing Devices

TID-17609 OTS $1.60

Argonne National Lab., Ill.
A BINARY SIEVE VERSION OF SOME SEQUENTIAL SWITCHING LOGIC PROCEDURES, by Frank Braden Hall. Rept. on Contract W-31-109-eng-38. Oct 62, 17p. 13 refs. UAC-6960.

TID-17653 OTS $9.60

Digital Computer Lab., U. of Illinois, Urbana
FURTHER STUDIES IN SPEED-INDEPENDENT LOGIC FOR A CONTROL, by Robert Earl Swartwout. Rept. on Contract AT(11-1)415. 13 Dec 62, 111p. 26 refs. Rept. no. 130.

TID-17950 OTS $5.60

Digital Computer Lab., U. of Illinois, Urbana.
TECHNICAL PROGRESS REPORT. PART I: HIGH-SPEED COMPUTER PROGRAM. PART II: CIRCUIT RESEARCH PROGRAM. PART III: SWITCHING THEORY. PART IV: MATHEMATICAL METHODS. PART V: ILLIAC USE AND OPERATION. PART VI: IBM 7090-1401 SYSTEM. PART VII: INSTRUCTIONAL USE OF THE IBM 7090-1401 SYSTEM. PART VIII: GENERAL LABORATORY INFORMATION. Rept. on Contract AT(11-1)415. Dec 62, 57p.

KAPL-M-RPC-7 OTS $1.10

Knolls Atomic Power Lab., Schenectady, N. Y.
TOOT (TYPE OUT OF TAPES), by S. A. Steimel. Rept. on Contract W-31-109-eng-52. Dec 62, 9p.

PB 163 257 OTS $5.60

Lehigh U., Bethlehem, Pa.
THE BOOLEAN ALGEBRA MODEL, by Donald J. Hillman, Rept. no. 2 on Study of Theories and Models of Information Storage and Retrieval, Grant G24070. 3 Aug 62, 58p. 37 refs.

DESCRIPTORS: *Data storage systems, *Information retrieval, *Algebras, *Mathematical logic, Computer logic.

Contents:
The logic of classes
Boolean algebra as a formalization of class logic
Class logic and Boolean algebra
The Boolean algebra model
Boolean algebra and the calculus of propositions
Functionally complete sets of primitive connectives
Theories and classification operations
(See also PB 163 256)

PB 163 256 OTS $2.60

Lehigh U., Bethlehem, Pa.
PROBLEMS, SYSTEMS AND METHODS, by Donald J. Hillman. Rept. no. 1 on Study of Theories and Models of Information Storage Retrieval, Grant G24070. 3 Aug 62, 25p. 13 refs.

DESCRIPTORS: *Data storage systems, *Information retrieval, Computer logic, Mathematical logic.

Contents:
The nature and scope of the problem of information retrieval
Types of retrieval system
  Systems based on descriptors
  Systems based on characters with hierarchy
  Systems based on characters with logic
Theories and models

NASA N63-15248 OTS $2.60

Rensselaer Polytechnic Inst., Troy, N. Y.
AN ADAPTIVE-PREDICTIVE MODEL FOR NONLINEAR PROCESSES WITH TWO-LEVEL INPUTS, by Rob Roy, W. R. Miller, and P. M. DeRusso. Rept. on NASA Grant NsG-244-62. [1962] 26p. 5 refs.

NASA N63-16683 OTS $2.60

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
VELOCITY CORRELATION MEASUREMENTS IN THE MIXING REGION OF A JET, by Marc A. Kolpin. Rept. on NASA Grant NsG-31-60. Mar 63, 21p. 1 ref. Rept. no. 1008; NASA CR-50192.

PB 163 201 OTS $5.60

Courant Inst. of Mathematical Sciences, New York U., N. Y.
MIXING-LENGTH ANALYSIS OF TURBULENT THERMAL CONVECTION AT ARBITRARY PRANDTL NUMBER, by Robert H. Kraichnan. Rept. on Contract Nonr-285(33). May 62, 52p. 21 refs. Research rept. no. HSN-6; NASA N62-14356.

DESCRIPTORS: *Turbulence, Turbulent boundary layer, *Fluid dynamic properties, Heat transfer, *Convection, Equations of motion, Reynolds number.

The mixing-length theory of turbulent thermal convection in a gravitationally unstable fluid is extended to yield the dependence of Nusselt number H/H_0 on both Prandtl number σ and Rayleigh number Ra. The analysis assumes a layer of Boussinesq fluid contained between infinite, horizontal, perfectly conducting, rigid plates. Also obtained is the dependence of mean temperature deviation $\overline{T}(z)$, root-mean-square temperature fluctuation $\widetilde{\gamma}'(z)$, and root-mean-square velocity upon height z above the bottom plate. The boundaries of the several σ ranges are determined. The dynamics are found to be importantly modified at extremely large Ra because of the stirring action of small-scale turbulence generated in shear boundary layers attached to the eddies of largest scale.

PB 163 200 OTS $2.60

Courant Inst. of Mathematical Sciences, New York U., N. Y.
MODEL OF ENERGY TRANSFER IN ISOTROPIC TURBULENCE, by R. H. Kraichnan and E. A. Spiegel. Rept. on Contract Nonr-285(33). Mar 62, 22p. 17 refs. Research rept. no. HSN-4; NASA N62-13835.

DESCRIPTORS: *Turbulence, Energy, Heat transfer, Functions, Numerical analysis, Fourier analysis, *Fluid dynamic properties.

An approximate energy-transfer function for isotropic turbulence is proposed on the basis of an analogy with radiative transfer in an inhomogeneous medium. An essential feature of the approximation is replacement of the actual triad interactions of the Fourier modes by interactions between pairs of modes. The interaction of each pair of modes satisfies detailed conservation of energy. Regardless of which mode has the higher wavenumber, the net transfer of energy is always from the more strongly excited to the more weakly excited mode of a pair. The transfer function gives an inertial range where the spectrum obeys the Kolmogorov law and where energy transfer is by local cascade. The spectrum in the far dissipation range falls off sufficiently rapidly that all spatial derivatives of the velocity field exist in mean square. (Author)

PB 163 199 OTS $3.60

Courant Inst. of Mathematical Sciences, New York U., N. Y.
A SPACE-TIME FUNCTIONAL FORMALISM FOR TURBULENCE, by R. M. Lewis and R. H. Kraichnan. Rept. on Contract Nonr-285(33). Mar 62, 32p. 6 refs. Research rept. no. HSN-5; NASA N62-13836.

DESCRIPTORS: *Turbulence, Velocity, *Functional analysis, Equations, *Statistical functions, Statistical distributions, Differential equations, Transformations (Mathematics), Green's function, Probability, Reynolds number, *Fluid dynamic properties.

The statistical theory of turbulence is formulated in terms of the characteristic functional Γ of a probability distribution of velocity fields in space-time. A functional differential equation for Γ is derived from the Navier-Stokes equation and the condition of incompressibility. All the moments of the velocity field may be determined as functional derivatives of Γ. The n-point space-time distribution functions of the velocity field ($n = 1, 2, \ldots$) are directly determined from the values of Γ for particular argument-functions. The present theory generalizes that of E. Hopf in that nonsimultaneous as well as simultaneous correlation functions are obtained from Γ. In addition, external driving forces are included in the formalism. This permits the representation, as functional derivatives of Γ, of the Green's functions which describe the averaged response of the velocity field to infinitesimal perturbations. As an illustration of the formalism, an explicit solution of the functional equation for Γ is obtained in the limiting case of vanishing Reynolds number, and the known results of the theory of "weak turbulence" are thereby recovered. (Author)

NASA N63-15932 OTS $1.10

Graduate Aeronautical Labs., Calif. Inst. of Tech., Pasadena.
STUDIES IN GRANULAR MECHANICS - I, by P. J. Blatz. Rept. on NASA Grant NsG-172-60, Suppl. 1-62. Jan 63, 8p. GALCIT-120; GALCIT SM-63-2.

UCRL-13059 OTS $8.60

Institute of Engineering Research, U. of California, Berkeley.
PROBLEMS IN THERMOVISCOELASTICITY, by R. L. Taylor. Rept. on Contract W7405-eng-48. Jan 63, 91p. 22 refs.

UCRL-10498 OTS $2.60

Lawrence Radiation Lab., U. of California, Berkeley.
DISLOCATION CONCEPTS OF STRAIN RATE EFFECTS, by John E. Dorn and Frank E. Hauser. Rept. on Contract W7405-eng-48. 4 Sep 62, 30p. 34 refs.

PB 163 133 OTS $2.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
ANALYSIS OF TAPERED CONICAL SHELLS, by E. Y. W. Tsui. Dec 61, 30p. 12 refs. Rept. no. 3-42-61-2.

DESCRIPTORS: *Structural shells, *Conical bodies, *Stresses, *Deformation, *Load distribution, Mechanics, Differential equations, Series, *Numerical analysis.

A closed-form solution of linearly tapered conical shells under external axial load and edge forces is presented in this paper. Influence coefficients and related functions for the practical range of shell parameters have been evaluated by the high-speed digital computer. Facts concerning the convergence of the series are discussed. A numerical example showing the analysis of stresses and deformations at and near the juncture of a shell structure is also given. (Author)

NASA N63-17210 OTS $4.60

Northrop Space Labs., Hawthorne, Calif.
LINEAR APPROACHES TO THE DYNAMICS OF FLUIDS SUBJECTED TO TIME VARYING BODY FORCES, by B. W. Randolph. Final rept., Apr 62-Mar 63, on NASA Contract NASr-23. Apr 63, 47p. 3 refs. NSL-63-21.

Aerodynamics and Pneumatics

AD-404 577 repriced OTS $2.25

General Electric Co., Cincinnati, Ohio.
RESEARCH AND EVALUATION OF MATERIALS FOR THERMOCOUPLE APPLICATION SUITABLE FOR TEMPERATURE MEASUREMENTS UP TO 4500°F ON THE SURFACE OF GLIDE RE-ENTRY VEHICLES, by W. C. Kuhlman. Final rept. 15 Mar 62-15 Mar 63, on Metallic Materials, Contract AF 33(657)8472. May 63, 83p. 3 refs. ASD-TDR-63-233; NASA N63-16400.

DESCRIPTORS: *Thermocouples, *Heat resistant metals and alloys, Boron compounds, *Boost-glide vehicles, Laboratory furnaces, Induction heating, Tungsten, Brittleness, Thermoelectricity, Ductility, Electric insulation, Resistance (Electrical), Zirconates, Rare earth compounds, Oxides, Beryllium compounds, Thorium compounds, Materials, High temperature research, *Re-entry vehicles, Transition elements, Alloys.

The thermoelectric output versus temperature of a W/W-26Re thermocouple was measured to 5800 F. Thermoelectric sensitivity was relatively high over the entire temperature range. Thermoelectric output on new thermocouple systems versus temperature was also measured with respect to W-26Re commercial wire for Re, Re-6W, Re-9W, Re-12W, Re-15W, Re-10Ru, Re-5Ru, Re-10Rh, Re-20Rh, Re-10Pt, Re-30Ir, Re-5Mo, Re-100s, Re-200s, Mo, Mo-10W, Mo-20W, Mo-10Re, Ir-20Re alloy materials. Of the alloys studied, Re-10Ru and Re-12W show the greatest potential for high-temperature thermocouple application. The oxides, BeO, ThO2, and HfO2, are compared as electrical insulators. Beryllia is best, but with proper geometry ThO2 and HfO2 would also be satisfactory. (Author)

NASA N63-16992 OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
COMPARISON OF STEADY-STATE AND SIX-DEGREE-OF-FREEDOM ANALYSES OF PITCH-ROLL RESONANCE CONDITIONS FOR A LONG SLENDER SOUNDING ROCKET, by Charles H. Whitlock. June 63, 28p. 5 refs. NASA TN D-1816.

NASA N63-14757 OTS $3.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
WIND-TUNNEL INVESTIGATION AT MACH NUMBERS FROM 1.60 TO 4.50 OF THE STATIC-STABILITY CHARACTERISTICS OF TWO NONLIFTING VEHICLES SUITABLE FOR REENTRY, by Kenneth L. Turner and David S. Shaw. Mar 59, declassified 12 Mar 63. 35p. NASA MEMO 3-2-59L.

AD-295 559 OTS $2.75

Republic Aviation Corp., Farmingdale, N. Y.
THERMAL STRESSES AND DEFLECTIONS IN RECTANGULAR PANELS. PART I. THE ANALYSIS AND TEST OF RECTANGULAR PANELS WITH TEMPERATURE GRADIENTS THROUGH THE THICKNESS, by M. J. Forray, M. Newman, and K. Kossar. Final rept. on Structural Analysis Methods, Contract AF 33(616)7751. Dec 62, 133p. 5 refs. ASD-TR-61-537, Part 1.

DESCRIPTORS: *Atmosphere entry, *Thermal stresses, Deflection, Temperature, *Strain gages, Deformation, Moments, Mathematical analysis, Structures, *Glass, *Airplane panels, Airframes, Heat transfer, Metal plates, *Windshields.

The problem of a rectangular plate subjected to both linear and nonlinear temperature gradients through the thickness, with no planform variation, is analysed for a variety of edge support conditions. Numerical evaluation of derived formulae for the deflections and bending moments are given in the form of non-dimensional curves for various aspect ratios and edge supports. Test results for glass plates are presented which are in good agreement with the calculated deflections for two aspect ratios and two edge conditions. Experimental difficulties prevented satisfactory verification of predicted strains. (Author)

Hydrodynamics, Hydraulics, and Hydrostatics

NYO-9603 OTS $1.60

Courant Inst. of Mathematical Sciences, New York U., N. Y.
NUMERICAL COMPUTATION OF HYDRODYNAMIC FLOWS WHICH CONTAIN A SHOCK, by John Gary. Rept. on Contract AT(30-1)1480. 1 Feb 62, 17p. 5 refs.

PB 163 377 OTS $1.60

David Taylor Model Basin, Washington, D. C.
COEFFICIENTS FOR INTERNATIONAL TOWING TANK CONFERENCE 1957 MODEL-SHIP CORRELATION LINE, by J. B. Hadler. Apr 58, 20p. 2 refs. Rept. 1185.

DESCRIPTORS: *Statistical functions, *Tables, *Reynolds number, *Ship models, Friction, Marine engineering, Ships, Resistance, Model tests, Friction.

This report gives a table of C_f versus R values for the "I. T. T. C. 1957 Model-Ship Correlation Line" recommended by the Eighth International Towing Tank Conference. In the determination of effective horsepower of ships this report should be used in conjunction with TMB Report 576. (PB 91 883) (Author)

KAPL-M-LXW-1 OTS $5.60

Knolls Atomic Power Lab., Schenectady, N. Y.
HAFMAT - STEADY-STATE FLOW DISTRIBUTION PROGRAM, by L. H. Wunderlich. Rept. on Contract W-31-109-eng-52. 23 Nov 62, 54p. 4 refs.

METALLURGY

PB 163 305 OTS $4.60

Alloyd Electronics Corp., Cambridge, Mass.
AN INVESTIGATION OF METALLIC THIN FILM COMPOSITE MATERIALS, by R. A. Covert and E. Rabinowicz. Rept. on Contracts AF 33(616)6479 and AF 33(616)7091. June 62, 49p. 10 refs. ASD-TDR-62-617; NASA N63-11570.

DESCRIPTORS: *Composite materials, Laminates, *Metal films, Thin films, *Silver, *Chromium, *Iron, *Copper, *Magnesium, *Lead, *Zinc, *Cadmium, *Tin, *Vapor plating, *Electroplating, Cold-working, Tensile properties, Hardness, Microstructure.

This report covers a study of metallic, multiple layer composite materials. Samples of Ag-Cr, Ag-Fe, Ag-Cu, Ag-Mg, Pb-Zn, Cd-Sn and Pb-Sn have been considered. Three fabrication techniques were considered-- alternate evaporation in vacua, alternate electroplating and cold rolling of alternate layer stacks.

Significant strength increases over pure and alloy materials have been observed for Ag-Cu and Pb-zn composites. These strengths do not approach the theoretically predicted levels, but the authors feel that they do warrant further study. (Author)

NASA N63-17218 OTS $4.60

Battelle Memorial Inst., Columbus, Ohio.
THE HARDNESS BEHAVIOR OF CHROMIUM ALLOYED WITH GROUP IV-A TO VIII TRANSITION METALS, by B. C. Allen and R. I. Jaffee. Rept. on NASA Contract NASw-101. 19 Dec 62, 41p. 37 refs. NASA-CR-50154.

KAPL-M-AA-4 OTS $1.60

Knolls Atomic Power Lab., Schenectady, N. Y.
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Nuclear Reactor Lab., Cornell U., Ithaca, N. Y.
FINAL SAFEGUARDS REPORT TO THE U. S. ATOMIC ENERGY COMMISSION FOR THE CORNELL UNIVERSITY ZERO POWER REACTOR, by Selwyn S. Berg. May 62, 247p. CURL-4.

NSEC(T)-18 OTS $1.60

Nuclear Science and Engineering Corp., Pittsburgh, Pa.
VOLATILE IODINE TRANSPORT THROUGH PIPES, by R. C. Koch, R. H. Marsh, and I. J. Gruverman. Rept. on Contract AT(30-1)2588. 25 Apr 60, 15p.

NYO-9735 OTS $4.60

Owens-Corning Fiberglas Corp., Granville, Ohio.
INVESTIGATIONS OF RADIOACTIVE FUEL-BEARING GLASSES, by P. A. Lockwood. Rept. for 1 May 60-31 Mar 61, on Contract AT(30-1)2489. 31 July 61, 49p.

NP-11272 OTS $9.10

Petrolite Corp., Webster Groves, Mo.
PETROLITE IRRADIATION REACTOR HAZARDS SUMMARY REPORT. Dec 61, 108p. 4 refs. Prepared in cooperation with Internuclear Co.

TID-17655 OTS $1.60

Phillips Petroleum Co., Idaho Falls.
INTEGRATED POWER FUEL PROCESSING, by Fred H. Tingey. Rept. on Contract AT(10-1)205. [1962] 16p.

TID-17658 OTS $1.10

Phillips Petroleum Co., Idaho Falls.
STOICHIOMETRIC AND RESIDUAL MASS DISTRIBUTION MEASUREMENT PROCEDURES FOR DETERMINING BURNUP, by F. H. Tingey. Rept. on Contract AT(10-1)205. [1962] 3p.

TID-17574 OTS $1.60

Savannah River Lab., Aiken, S. C.
CALCULATED EFFECTS OF NEUTRON RETHERMALIZATION IN D_2O COOLANTS, by Frank E. Driggers. Rept. on Contract AT(07-2)1. Jan 63, 13p. 3 refs.

DP-824 OTS $0.50

Savannah River Lab., Aiken, S. C.
PROCESSING OF POWER REACTOR FUELS, comp. by V. P. Caracciolo. Quarterly progress rept. no. 21, 1 Oct 62-1 Jan 63, on Contract AT(07-2)1. Mar 63, 8p. 4 refs.

SRO-76 OTS $1.10

Savannah River Operations Office, Atomic Energy Commission, Augusta, Ga.
HEAVY WATER POWER REACTOR PROGRAM. Monthly progress rept. Dec 62. 10p.

GEAP-3771-4 OTS $4.60

Vallecitos Atomic Lab., General Electric Co., San Jose, Calif.
HIGH PERFORMANCE UO_2 PROGRAM, by B. Weidenbaum. Quarterly progress rept. no. 4, Jan-Mar 62, on Contract AT(04-3)189. 1 Apr 62, 45p. EURAEC-437.

CVNA-165 OTS $2.60

Westinghouse Electric Corp., Pittsburgh, Pa.
CAROLINAS VIRGINIA NUCLEAR POWER ASSOCIATES, INC. RESEARCH AND DEVELOPMENT PROGRAM. Quarterly progress rept., July-Sep 62, on Contract AT(30-1)2289. 23p.

CVNA-40 OTS $17.50

Westinghouse Electric Corp., Pittsburgh, Pa.
CAROLINAS - VIRGINIA TUBE REACTION REFERENCE DESIGN II. Rept. on Contract AT(30-1)2289. 16 Dec 59, 273p. Prepared in cooperation with Stone and Webster Engineering Corp.

CVNA-43 OTS $3.60

Westinghouse Electric Corp., Pittsburgh, Pa.
UO_2 FUEL FABRICATION BY EXTRUSION, by W. E. Baily. Rept. on Contract AT(30-1)2289. 1 Feb 60, 39p. 3 refs.

Radioactivity

TID-17769 OTS $1.10

Duquesne Light Co., Shippingport, Pa.
ENVIRONMENTAL RADIATION MONITORING. Quarterly rept. no. 3, July-Sep 62, on Contract AT(11-1) 292. 8p.

NYO-9524 OTS $4.60

Isotopes, Inc., Westwood, N. J.
INTERPRETATION OF WESTWOOD, NEW JERSEY RAINFALL DATA. Quarterly progress rept. no. 1, on Contract AT(30-1)2415. 15 Sep 59, 44p. 13 refs.

Waste Disposal

BNL-6554 OTS $1.60

Brookhaven National Lab., Upton, N. Y.
TRANSPORT OF FISSION PRODUCTS THROUGH THE SOIL FOLLOWING INJECTION FROM A WELL AND METHODS USED FOR REMOVAL, by L. Gemmell and S. G. Pearsall. Rept. on Contract AT-30-2-GEN-16. [1962] 18p.

HW-74712 OTS $1.10

Hanford Atomic Products Operation, Richland, Wash.
FISSION PRODUCT AND WASTE PACKAGING-EFFECT OF GAMMA LEAKAGE ON THERMAL CALCULATIONS, by L. H. Steves and W. V. DeMier. Rept. on Contract AT(45-1)1350. 24 Aug 62, 8p. 4 refs.

PERSONNEL SUPPLIES AND PERSONAL EQUIPMENT

AD-295 640 OTS $2.60

Naval Supply Research and Development Facility, Bayonne, N. J.
A CLOTHING DESIGN TECHNIQUE USING MINIATURE MODELS, by Seymour Lash. June 62, 23p.

DESCRIPTORS: *Clothing, Design, Models (Simulations).

The conventional method of designing clothing prototypes is to make full size patterns and then fabricate full size garments. The designing technique developed at this facility uses a miniature mannequin for pattern dimensions. This mannequin is 23 1/2 inches tall and approximates a 1/3 proportion of a size 38 regular male form. A set of patterns (miniature) of several basic garments are included in this report. Such designs in the miniature is considerably cheaper and faster. These miniature mannequins can also be used to display new clothing items more effectively and utilize much less space than required by full-size display models. (Author)

PHYSICS

TID-17677 OTS $3.60

Argonne National Lab., Ill.
NOTES ON THE THEORY OF A COAXIAL SHUNT, by G. Cinelli. Rept. on Contract W-31-109-eng-38. 1 Oct 62, 31p. 5 refs.

PB 163 055 OTS $3.60

NRC Committee on Hearing and Bio-Acoustics, Washington, D. C.
CHABA - 1962, by Milton A. Whitcomb. Annual rept., Jan-Dec 62. Feb 63, 35p.

DESCRIPTORS: *Conferences, *Scientific organizations, *Hearing, *Psychoacoustics, *Audiometry, Airplane noise, *Acoustics, Personnel

Contents:
Comments from the secretariat
Summary of the 1962 annual meeting
Summary of CHABA working group meetings
Membership list

NASA N63-17230 OTS $1.60

Sylvania Electric Products, Inc., Waltham, Mass.
COMPARISON BETWEEN SPECTRAL SCANNING THEORY AND CLASSICAL COLOR VISION THEORIES by George Biernson. Rept. on NASA Contract NASw 441. 16 May 63, 17p. 6 refs. Res. Note-396; NASA-CR-50350.

Electronics

PB 163 374 OTS $8.10

Electrical Engineering Research Lab., U. of Illinois, Urbana.
THEORETICAL DESIGN OF A 35 Gc REBATRON, by Toshio Hosono. Technical note no. 5, Sep 61-Aug 62, on Megavolt Electronics, Submillimeter Wave Research, Contract AF 33(616)7043. 1 Dec 62, 83p. 7 refs. ASD-TDR-62-998.

DESCRIPTORS: *Linear accelerators, *Electron accelerators, Design, *Electromagnetic waves, Space charges, Waveguides, Cerenkov radiation.

The theoretical design of a rebatron (relativistic electron bunching accelerator) of the linear accelerator type to operate at 35 Gc is described. The characteristics of the pre-bunching uniform section and accelerating non-uniform section as well as the overall characteristics of the composite section are investigated. The analysis of disk-loaded waveguides is presented. The phase and energy velocity, power flow, and power loss are calculated taking into account the effects of space harmonic components. Finally, a numerical design for a standing-wave machine is presented. (Author)

LAMS-2796 OTS $1.60

Los Alamos Scientific Lab., N. Mex.
LASL PLASMA THERMOCOUPLE DEVELOPMENT PROGRAM. Quarterly status rept. for period ending 20 Oct 62 on Contract W7405-eng-36. Nov 62, 12p. NASA N63-10869.

NASA N63-16446 OTS $2.60

Maryland U., College Park.
COLLISION DAMPING OF PLASMA OSCILLATIONS I, by David Gorman and David Montgomery. Rept. on Grant NsG-220-62 and NSF (G24843). [1962] 21p. 9

PB 163 259 OTS $4.60

Microwave Devices Lab., U. of Utah, Salt Lake City.
MAGNETO-ELECTRIC COMPRESSION OF AN ELECTRON BEAM, by Lucky Kikushima and C. C. Johnson. Rept. on National Science Foundation Grants NSF G-15017 and NSF GP-843. Apr 63, 42p. 12 refs. Technical rept. NSF-3.

DESCRIPTORS: *Microwave equipment, *Waveguides, *Electron beams, Trajectories, Control, *Magnetic fields, Electromagnetic lenses, Electron guns.

This study is an investigation of how a high-density beam may be obtained by combining the convergence from a converging gun with the magnetic compression that may be obtained from an increasing field through a simple flat pole piece. By adjusting the size of the pole piece hole and thereby the transition length and the field strength, Brillouin flow of the compressed beam will result when the outer edge of the beam has the proper slope and radius as it enters the field. The goal sought is a current density of the order of 5000 amperes per square centimeter with a peak power density of 45 megawatts per square centimeter.

PB 163 274 OTS $4.60

Microwave Devices Lab., U. of Utah, Salt Lake City.
SPACE-CHARGE WAVES IN STATIONARY PLASMA, by Joseph Chen Lee and C. C. Johnson. Rept. on National Science Foundation Grants NSF G-15017 and NSF GP-843. May 63, 45p. 18 refs. Technical rept. NSF-4.

DESCRIPTORS: *Plasma physics, *Space charges, Excitation, Propagation, Dielectric properties, *Magnetic fields, *Waveguides, Tensor analysis.

The modes of propagation in a plasmaguide are electromechanical in nature, in which the electron density in the plasma column or on its surface is modulated as the wave passes. The space-charge waves are quite different from the modes of the hollow circular waveguide perturbed by a plasma column. They are slow waves and can propagate below the waveguide cutoff.

A brief systematic derivation of these waves along with a clear physical description is given.

TID-17221 OTS $4.60

Microwave Lab., Stanford U. Calif.
LINEAR ELECTRON ACCELERATOR STUDIES. Status rept., 1 Jan-31 Mar 58, on Contract AT(04-3)21. Apr 58, 46p. M. L. rept. no. 504.

TID-16990 OTS $1.60

Microwave Lab., Stanford U., Calif.
STUDIES OF PLASMA OSCILLATIONS. Quarterly status rept. no. 10, 1 Mar-31 May 62, on Contract AT(04-3)326. Sep 62, 11p. 3 refs. M. L. rept. no. 950.

TID-17028 OTS $2.60

Microwave Lab., Stanford U. Calif.
STUDIES OF PLASMA OSCILLATIONS. Quarterly status rept. no. 11, 1 June-31 Aug 62, on Contract AT(04-3)326. Oct 62, 25p. 6 refs. M. L. rept. no. 959.

NASA N63-16886 OTS $2.60

Plasma Research Lab., Rensselaer Polytechnic Inst., Troy, N. Y.
A GATED RADIOMETER FOR PLASMA AFTERGLOW STUDY, by W. C. Taft, K. C. Stotz, and E. H. Holt. Rept. on Grant NsG-48-60. Apr 63, 30p. 8 refs. Technical rept. no. 7.

NASA N63-16722 OTS $1.10

United Aircraft Corp., East Hartford, Conn.
RESEARCH ON THE COLLISION PROBABILITIES OF ELECTRONS AND CESIUM IONS IN CESIUM VAPORS, by R. H. Bullis and R. K. Flavin. Quarterly status rept. no. 4, 1 Feb-30 Apr 63, on NASA Contract NASr-112. 30 Apr 63, 8p. NASA CR-50049; A-920057-4.

Molecular Physics and Spectroscopy

TID-17667 OTS $2.60

Argonne National Lab., Ill.
A JAHN-TELLER EFFECT IN THE E_g VIBRATIONAL MODE OF HEXAFLUORIDE MOLECULES; THE INFRARED SPECTRA OF RuF_6 AND RhF_6, by Bernard Weinstock (Ford Motor Co.), Howard H. Claassen, and Cedric L. Chernick. Rept. on Contract W-31-109-eng-38. Oct 62, 27p. 29 refs. UAC-6978.

PB 163 153 OTS $2.60

Microwave Lab., Duke U., Durham, N. C.
DOUBLE QUANTUM TRANSITION IN ELECTRON SPIN RESONANCE OF GAMMA-IRRADIATION ACETYL-d,1-ALANINE, by Mikio Katayama. Final rept., 12 Oct 59-31 Jan 62, on Contract AF 49(638)765. [1962] 25p. 5 refs.

DESCRIPTORS: *Microwave spectroscopy, *Single crystals, Acetyl radicals, *Alanines, *Free radicals, *Gamma rays, Electrons, Spin, Resonance, *Resonance absorption, *Hyperfine structure, *Quantum mechanics, Atomic energy levels, *Electron transitions, *Selection rules, Abstracts, *Bibliographies.

Double quantum transistions were observed at high rf fields in hyperfine spectra of electron spin resonance of the free radical produced by the gamma-irradiation of acetyl-d,1-alanine. The presence of interaction between the free radicals give rise to the double quantum transitions. A theoretical explanation is given. (Author)
A 106 item bibliography of the papers published in connection with work done under this contract is included.

Solid State Physics

TID-17967 OTS $1.10

Arizona U., Tucson.
ANOMALOUS DIFFUSION RATE FOR SMALL PENETRATION DISTANCE IN COPPER, by D. L. Styris and C. T. Tomizuka. Rept. on Contract AT(11-1)1041. [1961] 6p. 4 refs.

TID-17583 OTS $3.60

Massachusetts Inst. of Tech., Cambridge.
THE EFFECT OF HIGH ENERGY RADIATION ON THE CRYSTAL GROWTH RATE, by Edward A. Mason and Robert C. Reid. Rept. on Contract AT(30-1)906. Nov 62, 38p. 75 refs.

PB 163 067 OTS $1.60

Michigan State U., East Lansing.
TRANSPORT PROPERTIES IN DILUTE ALLOYS, by F. J. Blatt. [1962] 19p. 82 refs. NASA N62-17568

DESCRIPTORS: *Alloys, *Metallic crystals, *Transport properties, Electrical conductance, Thermal conductance, Electrons, Crystal lattices, Models (Simulations), *Thermoelectricity, *Bibliographies.

Recent theoretical and experimental progress relating to transport properties in dilute alloys is reviewed, with particular attention paid to the value of conventional transport measurements in providing information on the electronic band structure of alloys. (Author)

PB 163 066 OTS $4.60

Northwestern Technological Inst., Evanston, Ill.
SOME ASPECTS OF SHORT-RANGE ORDER, by J. B. Cohen and M. E. Fine. [1962] 44p. 67 refs.

DESCRIPTORS: *Alloys, *Atomic structure, Low temperature research, Mechanical properties, Deformation, Quenching (Cooling), Crystal lattice defects, Solid state physics, Copper alloys, Aluminum alloys, Solids, Solutions.

The aspects of short-range order discussed are: (a) Experimental problems involved in determination of short-range order; (b) Nature of short-range order; (c) Kinetics and mechanism for increase in short-range order at low temperatures in quenched specimens; (d) Destruction of short-range order by plastic deformation, derivation of the fundamental equation for short-range order strengthening, and significance of the comparison with experimental results. (Author)

Thermodynamics

TID-17664 OTS $4.60

Argonne National Lab., Ill.
HEAT TRANSFER IN COUETTE FLOW OF A RADIATING FLUID WITH VISCOUS DISSIPATION, by R. Viskanta. Rept. on Contract W-31-109-eng-38. Sep 62, 45p. 9 ref. UAC-6983.

TID-17783 OTS $1.60

Heat Transfer and Thermodynamics Lab., U. of Michigan, Ann Arbor.
LOW HEAT-FLUX BOILING, by John A. Clark, Herman Merte, Jr., and Edward R. Lady. Quarterly progress rept. nos. 4, 5, 1 Apr-1 Oct 62, on Contract AT(38-1)260. Dec 62, 15p. 3 refs. 04653-4-P.

KAPL-M-EC-27 OTS $3.60

Knolls Atomic Power Lab., Schenectady, N. Y.
THD2 - TEMPERATURE DISTRIBUTION IN A SLAB WITH INTERNAL HEAT GENERATION, by Harvey H. Rhodes. Rept. on Contract W-31-109-eng-52, 18 Oct 62, 35p. 1 ref.

NBS-7608 OTS $1.60

National Bureau of Standards, Boulder, Colo.
ON THE CRYOGENIC ASPECTS OF PROJECT SHERWOOD. Progress rept. no. 11, 1 Jul-30 Sep 62, 19p. 5 refs.

Wave Propagation

PB 163 323 OTS $7.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A COHERENT MINIMUM-POWER LUNAR PROBE TELEMETRY SYSTEM, by Benn D. Martin. Rept. on Contracts DA 04-495-ORD-18 and NASw-6. 12 May 59, rev. 12 Aug 59, 80p. 15 refs. External Publication no. 610, rev. no. 1; AD-234 528.

DESCRIPTORS: *Lunar probes, *Telemeter systems, Design, Communication systems, Phase modulation, Frequency modulation, Narrow-band, Signal to noise ratio, *Space communication systems.

The FM/PM telemetry system for the Pioneer IV lunar probe was, of necessity, an efficient minimum-power phase-coherent communication link. It was designed to have a total power output of 180 mw and to be capable of threshold performance at two moon distances, one-half million miles. Space communication state-of-the art is discussed in general, and the design of the Pioneer IV telemetry system in particular. Emphasis is placed on the subcarrier data link and on the high degree of modulation-demodulation compatibility required by such a narrow-band system. The theoretical design criteria, information capacity, and actual implementation of this link are presented, followed by a summary of the actual system performance during the Pioneer IV experiment. (Author)

PB 163 322 OTS $1.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
OPTIMUM DEMODULATION, by Frank W. Lehan and Robert J. Parks. Rept. on Contract DA 04-495-ORD-18 [1952] 9p. 3 refs. External Publication 164; AD-252 348.

DESCRIPTORS: *Curve fitting, Detection, Statistical processes, *Radio signals, Modulation.

The technique of statistical curve fitting is applied to the problem of developing a system for the optimum demodulation of generalized modulated signals. The resulting equation is shown, under certain assumptions, to apply to a wide class of modulated signals. The implications of such application are discussed. (Author)

UCRL-7146 OTS $3.60

Lawrence Radiation Lab., U. of California, Livermore.
METHOD FOR CALCULATING THE AMPLITUDE OF THE REFRACTION ARRIVAL, by Glenn C. Werth. Rept. on Contract W-7405-eng-48. 28 Nov 62, 32p. 12 refs.

NASA N63-16888 OTS $1.10

New York U. Coll. of Engineering, N. Y.
THE PERFORMANCE OF A BANK OF DOUBLE, ISOLATED, SYNCHRONOUSLY-TUNED FILTERS FOR RECOVERING TONE BURST TELEMETRY SIGNALS, by Shepard Wenglin. Rept. on NASA Contract NAS5-408. 25 Jan 62, 7p. Technical memo. 22; NASA CR50113.

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

PB 163 096 OTS $2.60

California U., Berkeley.
RUSSIAN AFFIXAL LEXES AND LEX SEQUENCES, by C. Douglas Johnson. Rept. on Machine Translation Project. Mar 63, supersedes rept. dated Nov 61, 26p. 5 refs.

DESCRIPTORS: *Machine translation, *Language, Vocabulary, Biochemistry.

This paper includes the results of an attempt to identify, on the basis of non-text-derived information, those Russian derivational affixes sufficiently productive and translatable in the general vocabulary of biochemical literature to be considered independent translation units, i.e. lexes, in a Russian-English translation system. Recognition of such affixal lexes makes it possible to account for a vast vocabulary of both attested words and unattested neologisms with a minimal number of dictionary entries and, results, therefore, in great economy both of research effort and of computer operation.

PB 163 268 OTS $15.50

Computation Lab., Harvard U., Cambridge, Mass.
THE THEORY AND APPLICATIONS OF PUSHDOWN STORE MACHINES, by R. James Evey (Doctoral thesis), Rept. on Mathematical Linguistics and Automatic Translation. May 63, 236p. 40 refs. Rept. no. NSF-10.

DESCRIPTORS: Theses, *Machine translation, *Language, Programming (Computers), Programming languages, Algorithms.

In this thesis the pushdown store is used as a unifying principle in the study of some problems concerning the translation of languages. First, a hierarchy of machines is defined by adding counters and pushdown stores to finite state machines. Then the relation to formal grammars of languages and the use in translation of such machines are examined.

NASA N63-17336 OTS $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
RADIO AND OPTICAL SPACE COMMUNICATIONS, by P. D. Potter, R. Stevens, and W. H. Wells. Rept. on NASA Contract NAS7-100. 30 Oct 62, 22p. 38 refs. NASA CR-50062; JPL TM-33-85.

PB 163 253 OTS $1.60

Thompson Ramo Wooldridge, Inc., Canoga Park, Calif.
SURVEY OF PROBLEM AREAS IN CHINESE-ENGLISH MACHINE TRANSLATION. Technical note no. 1 on Computer-Aided Research in Machine Translation, Contract NSF-C233. 21 Aug 62, 18p.

DESCRIPTORS: *Machine translation, *Language.

Contents:
Input preparation and dictionary lookup
Grammar code
Homographs
Word packages
Anticipated rearrangement and "nesting" problems
Suggested application of pass method
Anticipated English synthesis problems

PB 163 262 OTS $13.50

Washington U., Seattle.
THE CHINESE-ENGLISH MACHINE TRANSLATION PROJECT. VOLUME ONE, PARTS I - VII, by Erwin Reifler. Final rept. on Grant NSF-G13579. Sep 62, 198p. 277 refs.

DESCRIPTORS: *Machine translation, *Language, *Dictionaries, Preparation.

Contents:
The work and the problems
The significance of the symbols of the Bilingual Glossary
The significance of the symbols of the simulated translations and their "improvements"
The simulated machine translations and their "improvements"
Bibliography.

PB 163 263 OTS $12.00

Washington U., Seattle.
THE CHINESE-ENGLISH MACHINE TRANSLATION PROJECT. VOLUME TWO, PART VIII. CHINESE-ENGLISH MT GLOSSARY, PART IX. ADDENDA, by Erwin Reifler. Final rept. on Grant NSF-G13579. Sep 62, 165p.

DESCRIPTORS: *Machine translation, *Language, *Dictionaries, Preparation.

(See also PB 163 262)

SOCIAL SCIENCES
Documentation

PB 163 315 OTS $8.10

American Inst. of Biological Sciences, Washington, D. C.
ACCURACY OF TITLES IN DESCRIBING CONTENT OF BIOLOGICAL SCIENCES ARTICLES, by Jessie Bernard (Pennsylvania State U.) and Charles W.

Shilling. Rept. on Biological Sciences Communication Project. 10 May 63, 90p. 22 refs.

DESCRIPTORS: *Subject indexing, Reports, *Biology, *Information retrieval, Standards.

Contents:
Increasing importance of titles
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PB 163 258 OTS $1.60

Engineers Joint Council, New York.
ACTION PLAN FOR IMPROVED DISSEMINATION OF ENGINEERING INFORMATION, by Eugene Wall. Progress rept. no. 1 (Revised) on Grant NSF-G24836. 23 Nov 62, 19p. 16 refs.

DESCRIPTORS: *Documentation, *Engineering, *Dissemination, Information retrieval, Subject indexing, Abstracts.

Work is proceeding on the creation of an Engineering Thesaurus and upon a training program for coordinated abstracting and indexing of journal articles by staff members of the journals. Contributions of technical terminology have been made by 18 engineering societies and other organizations. Altogether, the contributions have provided about 119,000 candidate terms for the research effort and for the Engineering Thesaurus.

PB 163 087 OTS $11.00

Johns Hopkins U., Baltimore, Md.
AN OPERATIONS RESEARCH AND SYSTEMS ENGINEERING STUDY OF A UNIVERSITY LIBRARY. Progress rept. on Grant NSF-GN-31. Apr 63, 144p.

DESCRIPTORS: *Operations research, *Systems engineering, *Libraries, Data processing systems, Information retrieval, Documentation.

Three principal areas of investigation are covered; A study of library usage; a study of circulation control using electronic data processing equipment, and an analysis of the library as an inventory system. This section will include a proposal for putting the union shelf list on magnetic tape and will state proposals for what we believe will be the future operating system for the library.

PB 163 061 OTS $2.60

Massachusetts Inst. of Tech. [Cambridge].
ANALYSIS OF BIBLIOGRAPHIC SOURCES IN A GROUP OF PHYSICS-RELATED JOURNALS, by M. M. Kessler. Rept. no. 4, 6 Aug 62, 22p. 22 refs.

DESCRIPTORS: Physics, *Periodicals, *Bibliographies, Sources, Statistical analysis, *Documentation, *Information retrieval.

The bibliographic sources in a group of physics-related journals are analyzed and compared with a previous study of the sources in the Physical Review. The frequencies of intercitation between the journals expressed as percentages are arranged in a matrix. It is shown that the properties of this matrix may be used to define a functionally related family of journals and its component parts. (Author) (See also AD 282 697)

PB 163 058 OTS $2.60

Massachusetts Inst. of Tech. [Cambridge].
BIBLIOGRAPHIC COUPLING BETWEEN SCIENTIFIC PAPERS, by M. M. Kessler. Rept. no. 2, 9 July 62, 30p. 4 refs.

DESCRIPTORS: *Reports, *Documentation, Statistical analysis, Periodicals, Information retrieval, Bibliographies.

This report describes the results of automatic processing of a large number of scientific papers according to a rigorously defined criterion of coupling. The population of papers under study was ordered into groups that satisfy the stated criterion of inter-relation. An examination of the papers that constitute the groups shows a high degree of logical correlation. (Author)

MISCELLANEOUS

PB 181 416 OTS $1.25, $10/year

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS. Sep 63.

DESCRIPTORS: *Naval research, *Scientific research, Radiation effects, Thermal radiation, Wire, Gadolinium compounds, Oxides, Atmosphere, Astrophysics, Chemistry, Liquids, Iodides, Algae, Oxygen, Mechanics, Shipborne, Impedance, Plywood, Aluminum, Hypervelocity guns, Metallurgy, Ceramic materials, Nickel, Ferromagnetic materials, Films, Tin alloys, Steel, Neutrons, Nuclear physics, Gamma rays, Optics, Infrared radiation, Radio, Radio transmitters, Hawaii, Radio interferometers, Navigation, Solid state physics, Calcium compounds, Fluorides, Scattering, Sound, Ocean currents, Reports, Patents

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Effects of Combined Thermal and Nuclear Radiation Environments on Magnet Wire Insulation, by F. J. Campbell
Dielectric Dispersion in Gadolinium Oxide at Audio Frequencies, by J. Pasternak and S. Levinson
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Chemistry: Upper limits for the contact angles of liquids on solids. Kinetics of the triiodide-iodide reaction on a platinum electrode in neutral solution. Some factors which affect the production of oxygen by algae in a small culture unit
Mechanics: Forced vibration study of shipboard equipment. Application of mechanical impedance to flaw detection in plywood. Hypervelocity impact studies of 1100F and 2024 aluminum. Petaling diaphragm for an 8.2, 2.5-inch hypervelocity gun

Metallurgy and Ceramics: Effects of various pressure of air and oxygen on the fatigue life of nickel at two temperatures. Effects of He^3 irradiation on the magnetic properties of thin ferromagnetic films. High-temperature oxidation of tin-aluminum alloys. Neutron embrittlement of reactor pressure vessel steels

Nuclear and Atomic Physics: Stochastic estimates of the penetration of gamma rays through slab shields

Optics: Interpretation of infrared radiation from the sea in terms of its boundary layer

Radio: Technique of combining the outputs of two AN/FRA-49V transmitter multicoupler equipments applied to the AN/SRA-14 equipment. Field-strength measurements of vlf signals from the U.S. Navy radio station at Lualualei, Hawaii and from the Omega transmitter at Haiku, Hawaii. Radio-interferometer analog phase-channel combiner (Mod II) for unambigious space-angle measurements in the Navy space surveillance system. Geomagnetic, three-dimensional navigation system proposed for aircarft

Solid-State Physics: New preparation procedures yield tenfold improvement in the sensitivity of thermoluminescent, manganese-activated calcium fluoride to gamma radiation. Averaging scattered radiation.

Sound: Exploratory deep sea instrumentation obtains data on the variations of current and temperature in the Tongue of the Ocean

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